

## A survey of the *Eupithecia* fauna (Lepidoptera, Geometridae) of the Western Himalayas: Part II

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**Abstract** In the second part of this series, four new species and one new subspecies of *Eupithecia* are described from Kashmir and adjacent territories of Pakistan and India. *Eupithecia mesodeicta* Prout, 1938 is raised to a specific name, and *Eupithecia vivida* Vojnits & De Laever, 1978, and *Eupithecia particeps* Vojnits, 1988 are restored.

**Key words** Kashmir (Pakistan/India), Eupitheciini (Lepidoptera, Geometridae), revision, taxonomy, synonymy, distribution, new species, new subspecies, *Eupithecia pusillata kashmirica* Mironov & Ratzel, subsp. n., *Eupithecia alexiae* Galsworthy & Mironov, sp. n., *Eupithecia pannosa* Mironov & Galsworthy, sp. n., *Eupithecia vetula* Mironov & Ratzel, sp. n., *Eupithecia firmata* Mironov & Ratzel, sp. n., *Eupithecia mesodeicta* Prout, 1938, stat. n., *Eupithecia vivida* Vojnits & De Laever, 1978, sp. rev., *Eupithecia particeps* Vojnits, 1988, sp. rev.

## Introduction

This is the second part of a three part paper surveying and revising the *Eupithecia* of the Western Himalayas. A full introduction and background was given with the first part (Mironov *et al.*, 2008).

Abbreviations. BMNH: The Natural History Museum, London, United Kingdom; MNHU: Museum für Naturkunde, Zentralinstitut der Humboldt-Universität zu Berlin, Germany; ZFMK: Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn, Germany; ZSM: Zoologisches Staatssammlung München, Germany; SMNK: Staatliches Museum für Naturkunde, Karlsruhe, Germany; SMNS: Staatliches Museum für Naturkunde, Stuttgart, Germany; TTM: Termesztudományi Múzeum Allattára (Hungarian Natural History Museum), Budapest, Hungary; NHRS: Naturhistoriska Riksmuseet, Stockholm, Sweden; MHMW: Naturhistorisches Museum Wien, Austria; ZISP: Zoological Institute, Russian Academy of Sciences, Saint Petersburg, Russia; IAET: Institute of Agriculture and Environment, Estonian Agricultural University, Tartu, Estonia; NSMT: National Science Museum, Tokyo, Japan; EIHU: Entomological Institute, Hokkaido University, Sapporo, Japan; ZMKU: Zoological Museum, National Shevchenko University, Kiev, Ukraine; ZMMU: Zoological Museum, Moscow State University, Russia; coll. László: coll. Gyula M. László, Budapest; coll. Ratzel: coll. Ulrich Ratzel, Karlsruhe.

## *Eupithecia impavida* Vojnits, 1979

*Eupithecia impavida* Vojnits, 1979, *Acta zool. Acad. Sci. hung.* **25**: 206, fig. 18.

*Eupithecia secura* Vojnits, 1979, *Acta zool. Acad. Sci. hung.* **25**: 428, fig. 4, 5. **Syn. n.**

*Eupithecia commiserenda* Vojnits, 1983, *Acta zool. Acad. Sci. hung.* **29**: 270, fig. 13. **Syn. n.**

Misidentification: *Eupithecia pacifica* Inoue, 1980, *Bull. Fac. domest. Sci. Otsu Univ.* **16**: 163, figs 39T, U, 40A, 41B, 42I, 53A, 58A. Paratypes only (see remarks below).

This is a widespread and apparently relatively common species, which ranges from the

Western Himalayas across south and central China to Japan. It belongs to the *undata* group. It is here recorded for the first time for the fauna of Pakistan and Kashmir. Habitus and male genitalia were illustrated in Inoue (2000) as *E. commiserenda*.

Examined type material. ♂, China, Provinz Nord-Yuennan, Li-kiang, X, 14. viii. 1935, H. Höne, Vojnits slide no 11470 (holotype of *E. impavida*, ZFMK); ♀, [China], Sued-Shensi [Shaanxi], Tapaishan [Dabaishan] im Tsinling [Qinling], ca 1,700 m, 24. vii. 1936, H. Höne, Vojnits slide no 12215 (holotype of *E. securo*, ZFMK); ♂, Nepal, Prov. Nr. 3, East Junbesi, 2,750 m, 25–31. vii. 1964, leg. W. Dierl, Vojnits slide no 11955 (holotype of *E. commiserenda*, ZSM).

Recent material. 4 ♀, Pakistan, Himalaya Mts, Kaghan valley, 20 km NE Balakot, Tathabaya, 73°25'E, 34°41'N, 2,400 m, 25 and 27. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM); 1 ♂, same locality, Tathabaya, 73°25'91"E, 34°35'33"N, 2,150 m, 9. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 2 ♂, Pakistan, Kashmir, Himalaya Mts, 30 km N Murree, Ayubia, 73°24'03"E, 34°01'75"N, 2,650 m, 5–6. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 5 ♂, same locality, near Nathia Ghali, Ayubia vill., 2,600 m, 10. vii. 2000, leg. Varga & Ronkay (ZFMK); 1 ♀, Pakistan, Kashmir, Himalaya Mts, Nathiagali, Baragali Campus, 73°21'51"E, 34°05'47"N, 2,350 m, 24. vii. 1998, leg. G. Csorba & L. Ronkay (TTM).

Remarks. The characters of this species, based on material from Japan, were described by Professor H. Inoue under the name *pacifica*. Unfortunately, he dissected only the paratypes in the type series under that name, all of which belong to the present species, and the genitalia descriptions and photographs in his original description are applicable to this species. He left the male holotype ([Japan], Nagano Pref., Dakesawa, 1. viii. 1958, Y. Kobayashi, BM Geom. slide no 22006) undissected: we have now dissected it and discover that it is in fact a specimen not of the present species, but of the externally similar *E. consortaria* Leech, 1897. *E. pacifica* Inoue, 1980 thus becomes a junior synonym of *consortaria* Leech (**syn. n.**).

### *Eupithecia venosata* (Fabricius, 1787)

*Phalaena venosata* Fabricius, 1787, *Mantissa Insect.* 2: 209.

*Eupithecia comparanda* Vojnits, 1981, *Annales hist.-nat. Mus. natn. hung.* 73: 221, figs 1, 2. **Syn. n.**

This handsome and distinctive West Palaearctic species is distributed eastward to West Siberia (Russia). Externally, specimens from Pakistan, which were described as *E. comparanda*, do not differ from European specimens. Both male and female genitalia of adults from Pakistan are closely similar to those from European specimens, except that in males sternite A8 is a little more heavily sclerotized, while remaining exactly the same shape. *E. venosata* was unknown from Central Asia until the present, and the population of this species in the mountains of north-eastern Pakistan and northern India may be entirely disjunct.

Examined type material. ♂, W-Pakistan, Swat, Nv. Kalam, Gabral-Tal, 2,100 m, 9. vii. 1969, leg. G. Ebert, Vojnits slide no 12093 (holotype of *E. comparanda*, SMNK); 3 ♂ 3 ♀, W-Pakistan, Swat, Kalam, 2,000 m, 9. vii. 1969, leg. G. Ebert, Vojnits slides nos 12094, 12095, 12096 ♂, 12099, 12100, 12102 ♀ (paratypes of *E. comparanda*, SMNK); 1 ♂ 1 ♀, W-Pakistan, Swat, Kalam, 2,000 m, 9. vii. 1969, leg. G. Ebert, Vojnits slides nos 12097 ♂, 12098 ♀ (paratypes of *E. comparanda*, TTM).

Recent material. 1 ♂ 5 ♀, NW Pakistan, Prov. Swat, 15 km nördl. Kalam, Gabral-Tal, 2,100

m, 6–9. vii. 1969, leg. Vartian, Vojnits slides nos 15644, 16189, 16190, 16191, 19369 (TTM); 3 ♂, Indien, Lahoul, Koksar, ca 3,000 m, 16, 17. vii. 1980, leg. W. Thomas, Ratzel slide no GU18805/1m (SMNS); 1 ♀, Pakistan, Hindukush Mts, 5 km E of Shandur pass, 72°38'E, 36°07'N, 3,750 m, 26–27. vi. 2000, leg. Z. Varga & G. Ronkay (ZFMK); 1 ♂, Pakistan, Azad Jammu & Kashmir, Thunian, 2,300–2,700 m, 25–30. viii. 2004, leg. V. Gurko (coll Ratzel); 1 ♂, Pakistan, Himalaya Mts, 3,200 ft., Kaghan Valley, 12 km E of Naran Battakundi, 73°40'E 34°57'N, 26. vii. 1994, leg. B. Herczig, Gy. M. Laszlo & G. Ronkay (coll. László).

***Eupithecia silenicolata* Mabille, 1867**

*Eupithecia silenicolata* Mabille, 1867, *Annls Soc. ent. Fr.* (4) 6 (4): 562, pl. 8, figs 9a, b.

This is a very interesting and unexpected find in the Hindukush Range. It is a new species for the fauna of Pakistan, where, possibly, it has an eastern limit of distribution. The single known specimen from Pakistan is pale and worn, but the main dark transverse lines (basal, ante- and postmedian) on the wings are more or less clear. The male genitalia and the shape of the eighth sternite are similar to those of European and Transcaucasian specimens.

Examined type material. ♀, Bastia, *silenicolata* M., type, coll. P. Mabille C. H. acq. 1953 (paralectotype, designated by Herbulot, coll. Herbulot in ZSM).

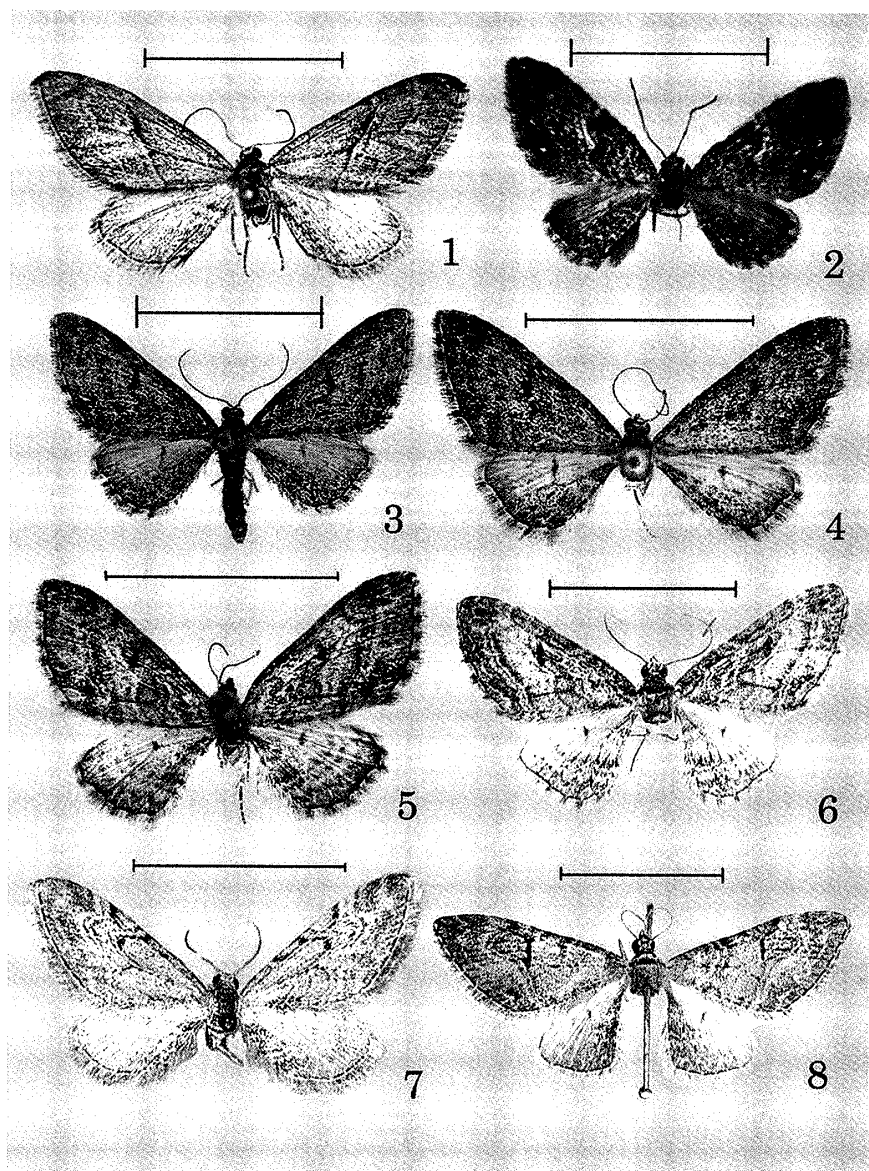
Recent material. 1 ♂, Indien, J & K, Ladakh, Fatu-La, 3,700 m, 7–8. vii. 1981. leg. W. Thomas, Ratzel slide GU18805/2m (SMNS); 1 ♂, N Pakistan, Shandur pass, 36°05'N, 72°32'E, 3,600 m, 21. vi. 1992, leg. M. Hreblay & G. Csorba (TTM); 1 ♀, NW Pakistan, 20 km W of Besham, Karaora, 1,200 m, 34°53'N, 72°47'E, 27. v. 1992, leg. M. Hreblay & G. Csorba, Vojnits slide no 19457 (TTM); 1 ♀, NW Pakistan, 3 km NW of Garam Chasma, 2,600 m, 36°05'N, 71°22'E, 23. vi. 1992, [leg. M. Hreblay & G. Csorba] (TTM); 1 ♂, Pakistan, Hindukush Mts, 5 km E of Shandur pass, 72°32'E, 36°10'N, 3,500 m, 13. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM).

Remarks. There are two Asian subspecies of this species: *E. silenicolata perdistincta* Wehrli, 1933 from Lebanon and *E. silenicolata soultanabadi* Brandt, 1941 described from Iran, both of which are known to us only on the basis of the original descriptions and illustrations.

***Eupithecia pusillata kashmirica* Mironov & Ratzel, subsp. n. (Fig. 1)**

Differential description: on average larger than nominate subspecies: wingspan ♂ 19.5–24 mm (average 21.3 mm,  $n=35$ ), ♀ 18–23 mm (average 20.9 mm,  $n=73$ ). Distinguished from nominate European subspecies by the narrower elongate fore wing with pointed apex and very oblique termen, the indistinct pattern on the wings, the inconspicuous transverse lines, the oblique dark antemedian and median lines, which are sometimes connected with each other for almost their whole length, apart from a short distance near the costa. Adults of this subspecies can be distinguished from the closely related species from Japan, *E. masuii* Inoue, 1980 by the darker narrow medial area between the two median transverse lines, the postmedian transverse line with broader and darker inner shade, and the narrow and elongated discal dot, which is placed obliquely with respect to the costa of the fore wing. However, no clear-cut differences have been found in the male and female genitalia between the very variable and widespread *E. pusillata* and the Japanese *E. masuii*.

The male genitalia (Fig. 17) of the new subspecies is only distinguished from those of the nominate subspecies by the narrower valve with more prominent ventral process, and the

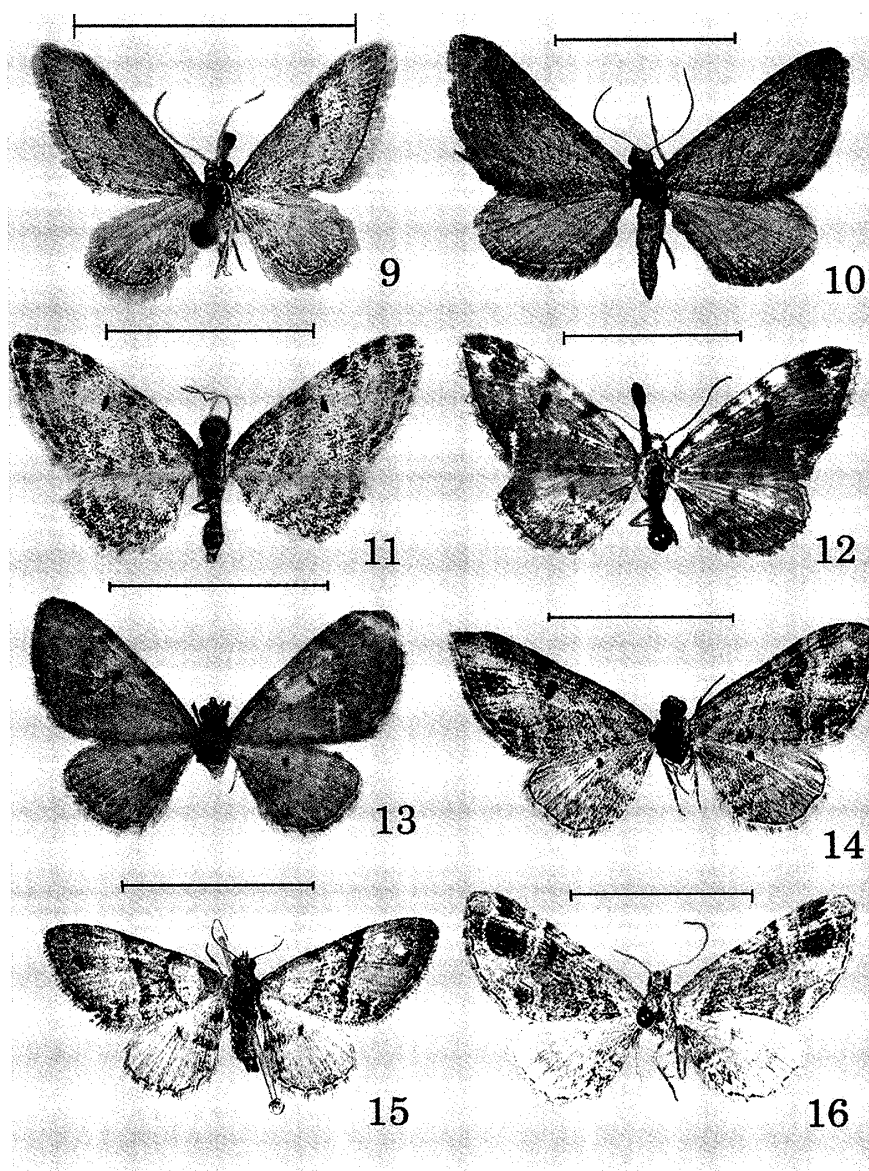


Figs 1–8. *Eupithecia* adults (scale bar=1 cm). 1. *E. pusillata kashmirica* Mironov & Ratzel, subsp. n. (holotype). 2. *E. alexiae* Galsworthy & Mironov, sp. n. (holotype). 3. *E. pannosa* Mironov & Galsworthy, sp. n. (holotype). 4. *E. vetula* Mironov & Ratzel, sp. n. (paratype). 5. *E. firmata* Mironov & Ratzel, sp. n. (paratype). 6. *E. mesodeicta* Prout, 1938 (lectotype). 7. *E. nepalata* Schütze, 1961. 8. *E. acutangula* Hampson, 1895 (holotype).

two longer horn-like cornuti on the vesica of the aedeagus. The female genitalia (Fig. 27) are similar to those of the nominate subspecies of *E. pusillata*, but can be distinguished by the presence of a patch of dense spines at the base of the longitudinal chain of spines and the membranous, but thick-walled, spineless area on the left side of the corpus bursae.

**Similar species.** The new subspecies is rather more similar externally to brownish, almost patternless specimens of the Mediterranean *Eupithecia oxycedrata* (Rambur, 1833) than to the nominate subspecies of *E. pusillata*.

**Holotype.** ♂, Pakistan, n Chilim, Deosai Mts, 3,500 m, 17. viii. 2004, leg. V. Gurko, Ratzel slide no 30405/3 (SMNK). **Paratypes.** 35 ♂ 78 ♀, (4 exs with lost abdomen), same locality



Figs 9–16. *Eupithecia* adults (scale bar=1 cm). 9. *E. anemica* Viidalepp, 1988. 10. *E. assectata* Dietze, 1904 (syntype). 11. *E. dzhirgatalensis* Viidalepp, 1988. 12. *E. thermosaria* Hampson, 1903. 13. *E. ebriosa* Vojnits, 1979 (holotype). 14. *E. incurvaria* Hampson, 1903 (holotype). 15. *E. latimedia* Hampson, 1895 (holotype). 16. *E. acolpodes* Prout, 1938 (holotype).

and data, Ratzel slides nos GU121204/1w, GU30405/2w, GU30405/3w, GU30405/4w (SMNK, SMNS, coll. Ratzel, BMNH, ZISP); 1 ♂ 1 ♀, Indien, J & K, Kashmir, Sonamarg, 2,900 m, 25. vii and 13. viii. 1988, leg. W. Thomas (ZFMK); 1 ♂, Pakistan, Kashmir, Himalaya Mts, Kashmir Deosai Plains, Deosai Pass, 4,250 m, 17. viii. 1998, leg. Z. Varga & G. Ronkay; 1 ♀, Pakistan, Karakoram Mts, Naltar Valley, 12 km NW Nomal, ca 2,000 m, 74°10'E 36°09'6"N, 16. vii. 1994, leg. B. Herczig, Gy. M. László and G. Ronkay (coll. László).

***Eupithecia alexiae* Galsworthy & Mironov, sp. n. (Fig. 2)**

♂. Diagnosis. Wingspan 19 mm; fore wing 10 mm. Fore wing elongate and fairly broad, costa nearly straight, termen gently curved and inner margin straight. Ground colour of all wings warm brown. Fore wing transverse lines obscurely marked in pale fawn; antemedian double, wavy; median double, the inner line heavier than other lines, sharply angled around discal dot, giving a narrow white fascia to the centre of the wing; antemedian double, faint and wavy; subterminal wavy white line weakly present; terminal line brown, interrupted on veins; fringes chequered brown and white. Discal dot small, round, brown. Hind wing rather small in relation to fore wing, basal and median area paler than fore wing. Anal margin well marked with beginnings of transverse lines, but only postmedian fully present, as a wavy white line. Terminal line and fringes as fore wing.

Male genitalia (Fig. 18). Uncus broad, triangular, uniapical. Valve relatively short and broad, tapered in outer half to a broadly curved apex. Sacculus slightly more sclerotized, with a small U-shaped indentation in the ventral margin. Vinculum broad, curved throughout. Papillae on anterior arms of labides long and slender, bearing setae only at the tip. Aedeagus fairly broad, about length of valve, the vesica armed with one long needle-like cornutus in its apical half, and two small plates, one close to ductus ejaculatorius base. Sternite A8 peg-shaped, broad at anterior end, narrowing sharply and evenly to posterior end, the latter parallel sided and notched at apex. Anterior hollow broadly V-shaped.

Female unknown.

Similar species. This species belongs to the *tripunctaria* group. Its small size and the combination of a dark brown fore wing with a narrow white median fascia are very distinctive and should distinguish it from other members of that group. In size and general appearance it is more reminiscent of some members of the *haworthiata* group, such as *E. bohatschi*, but is easily distinguished from them on the genitalia. The latter are unique in the *tripunctaria* group in having a notch in the ventral margin of the valve.

Holotype. ♂, Kashmir, Gulmarg, 13. vi. (19)31, Fletcher coll., BM Geom. slide no 21845 (BMNH).

Derivatio nominis. The species is named after the granddaughter of Sir Anthony Galsworthy.

***Eupithecia tenuisquama* (Warren, 1896)**

*Tephroclystia tenuisquama* Warren, 1896, *Novit. zool.* 3: 317.

*Eupithecia toshimai* Inoue, 1980, *Bull. Fac. domest. Sci. Otsuma Wom. Univ.* 16: 177, figs 44C, 46B, 47O–Q, 49G (synonymised by Inoue, 2000).

A widespread species ranging from the Himalayas to Japan. New for the fauna of Pakistan. Habitus and male and female genitalia were illustrated in Inoue (2000).

Examined type material. ♀, Darjeeling (Pilcher), 10. iii. [18]89, *Eupithecia tenuisquama*, Warren, Rothschild donation BM 1939-1, Vojnits slide no 19296, BM Geom. slide no 20125 (lectotype, here designated); ♀, Darjeeling (Pilcher), 9. iii. (18)89, Rothschild donation BM 1939-1 (abdomen missing); ♀, Sikkim, 1. iv. (18)89, J. G. Pilcher, *tenuisquama* Warr. Type ♀, BM Geom. slide no 20124 (BMNH); ♀, Sikkim, 1. iv. (18)89, J. C. Pilcher, *Eupithecia tenuisquama*, Warr, Rothschild donation BM 1939-1 (?syntypes of *E. tenuisquama*, BMNH); ♂, [Japan], Mt Zôzu, Kagawa (Pref.), 14. iv. 1967, H. Toshima (holotype of *E. toshimai*, BMNH).

Older material. 1 ♂, India U. P., Naini-Tal, 6,600 ft., 24. iii. 1935, J. A. Graham, BM 1935-424, BM Geom slide 20839; 1 ex., Narkundah [Narkanda], H. McArthur coll. April 1888 (BMNH).

Recent material. 2 ♂, Pakistan, Prov. NW-Frontier, 35 km N of Murree, Ayubia NP, 2,450 m, 24. iv. 1999, leg. B. Benedek & A. Szabó (coll. Sommerer); 1 ♂, Pakistan—Azad, Jammu+Kashmir, Thunian, 2,300–2,700 m, 25–30. viii. 2004, leg. V. Gurko, Ratzel slide no GU 20505/2w (coll. Ratzel).

Remarks. There is difficulty over the type series of *tenuisquama*. Warren states that it is based on “3 ♀♀ from Darjiling, March and April (Pilcher leg.)”. There are two females in the BMNH series which fit this description, but the type label, in Prout’s handwriting, is placed on one of two further female specimens from Sikkim, also collected by Pilcher. All four originate from the Rothschild collection, which Warren was at the time working on, and given their dates of collection, should have been available to him. It is impossible to say at this remove whether Warren’s original locality data was inaccurate, or whether labels have been shifted in the intervening years, or whether one of the original type series has perished. Happily, all four specimens are conspecific: to ensure stability, we now designate one of the two specimens from Darjeeling, for which there is a genitalia preparation, as lectotype (details above).

### *Eupithecia invicta* Vojnits, 1981

*Eupithecia invicta* Vojnits, 1981, *Annls hist.-nat. Mus. natn. hung.* **73**: 226, fig. 9.

*Eupithecia acuta* Vojnits, 1983, *Acta zool. Acad. Sci. hung.* **29**: 276, fig. 23. **Syn. n.**

Habitus and male and female genitalia were illustrated as *E. acuta* in Inoue (2000).

Examined type material. ♂, Nord-Indien/Kumaon, Bhimtal (Nainital), 1,450 m, 23. ix. 1973, Lichtfang, leg. S. Richter, Vojnits slide no 12126 (holotype of *E. invicta*, SMNK); ♀, Nepal, Prov. Nr. 2, East Jiri, 2,000 m, 6. iv. 1964, leg. W. Dierl, Vojnits slide no 10642 (holotype of *E. acuta*; ZSM).

Older material. 2 ♂ 2 ♀, Dharmasala, (18)87-59 (755), sugar, BM Geom slides 21493 (♂) and 21496 (♀) (BMNH).

Recent material. 1 ♂, Indien, Himachal Pradesh, Kullu valley, oberh. Kullu, 31°57′N, 77°09′E, 1,500 m, 22. x. 1990, leg. H. Hacker (ZFMK).

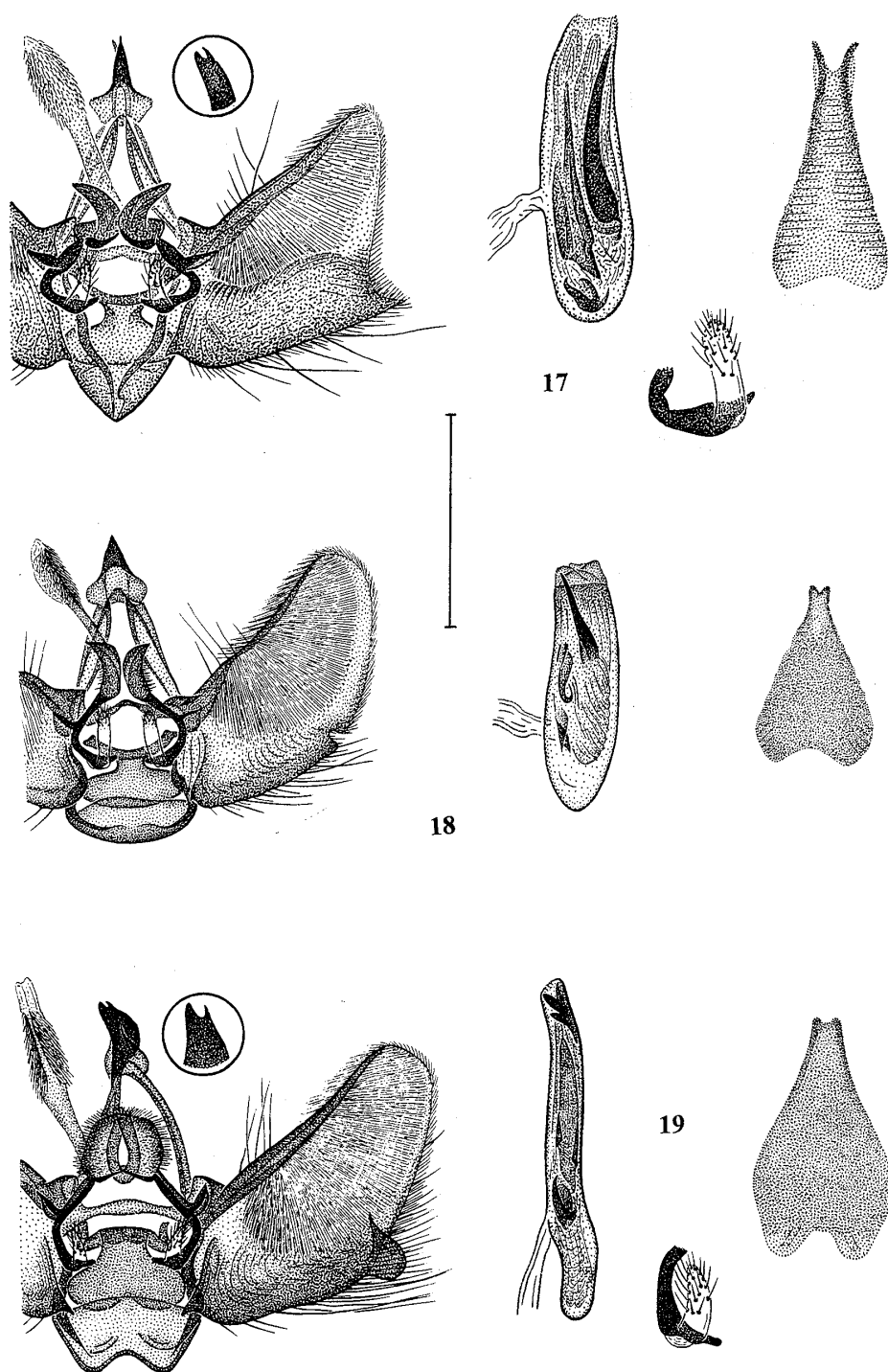
Remarks. The holotype specimen of *Eupithecia invicta* Vojnits, 1981 was collected in Nainital in the year 1973, not in “Noinital” in 1972, as stated erroneously in Vojnits (1981).

### *Eupithecia lariciata* (Freyer, 1842)

*Larentia lariciata* Freyer, 1842, *Neuere Beitr. Schmettkde* **4** (61): 135, pl. 366.

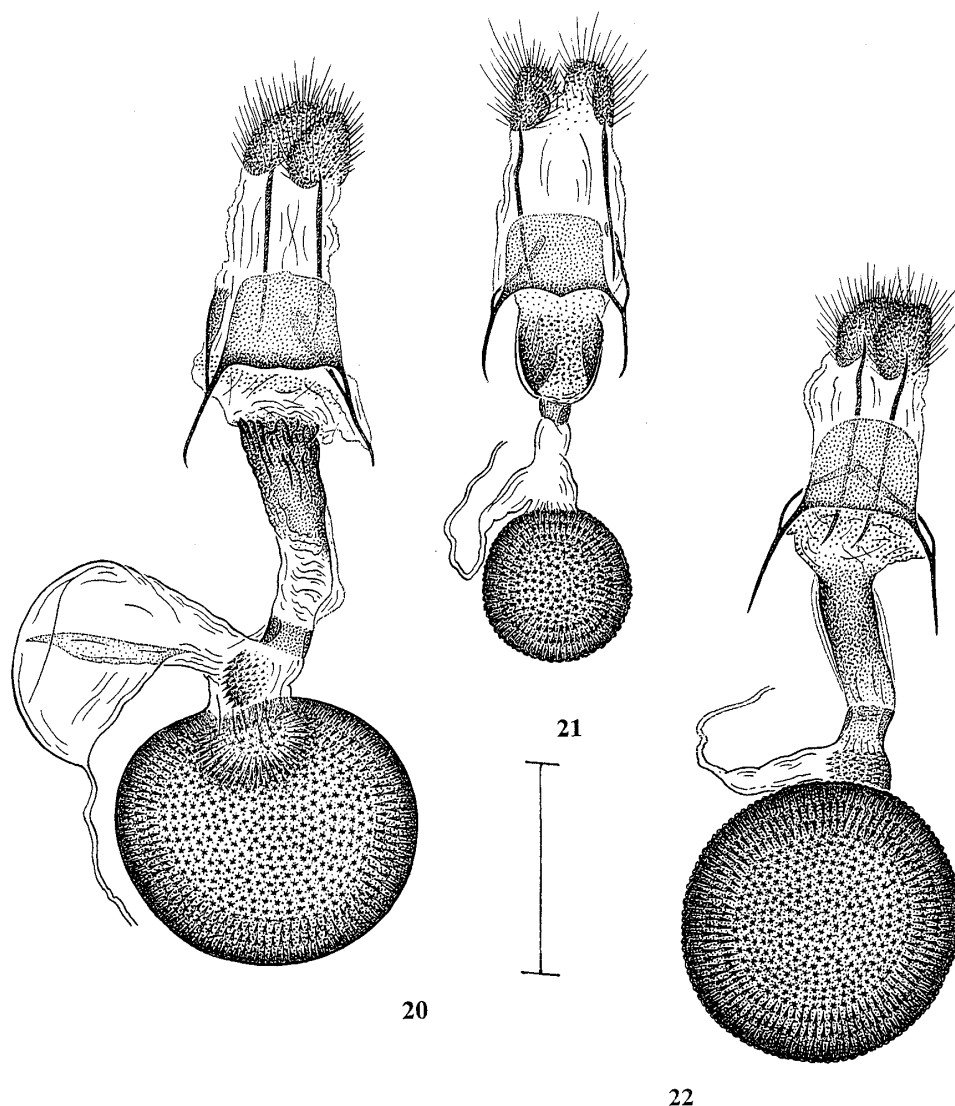
The two Kashmirian specimens detailed below are paler than most European specimens, but their genitalia are similar to those of nominate *E. lariciata* and are easily distinguishable from the female genitalia of all other known Asian species of the “*lariciata*” group. A new species for the fauna of Kashmir.

Examined material. 2 ♀, Indien, J & K, Kashmir, Daksum, 2,300 m, 6, 7. vii. 1987, leg. W. Thomas (ZFMK).



Figs 17–19. Male genitalia of *Eupithecia* species (scale bar=1 mm: males with sternite A8, and lateral view of uncus and papillae on the anterior arms of labides enlarged). 17. *E. pusillata kashmirica* Mironov & Ratzel, subsp. n. 18. *E. alexiae* Mironov & Galsworthy, sp. n. 19. *E. pannosa* Mironov & Galsworthy, sp. n.





Figs 20–22. Female genitalia of *Eupithecia* species (scale bar=1 mm). 20. *E. pannosa* Mironov & Galsworthy, sp. n. 21. *E. vetula* Mironov & Ratzel, sp. n. 22. *E. firmata* Mironov & Ratzel, sp. n.

### *Eupithecia conjunctiva* Hampson, 1895

*Eupithecia conjunctiva* Hampson, 1895, *Fauna Br. India* (Moths) 3: 400.

Habitus and male genitalia were illustrated in Inoue (2000).

Examined type material. ♀, [India], Dharmasála 87-59, *Eupithecia conjunctiva* Hmps. type ♀, BM Geom. slide no 20315 (holotype, BMNH).

Older material. 1 ♀, Masuri, 6. ix. 21 (BMNH).

Recent material. 1 ♀, Pakistan, SW-Himalaya, Indus-Kohistan, Kaghantal, Naran, 3,000–4,500 m, 16. vii–5. viii. (19)77, leg. de Freina (SMNS); 3 ♀, Indien, Kaschmir, Gulmarg, 2,800 m, 9, 10. viii. 1980, leg. W. Thomas (SMNS); 2 ♀, Indien, J & K, Kashmir, vic. Srinagar, 1,900 m, 3. viii. 1986, leg. W. Thomas (ZFMK, ZISP); 5 ♀, same locality, vic. Gund, ca 2,200 m, 14. viii. 1988, leg. W. Thomas (ZFMK); 1 ♀, Pakistan, Himalaya Mts,

Kaghan valley, 20 km NE Balakot Tathabaya, 73°25'E, 34°41'N, 2,400 m, 27. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM); 1 ♀, Pakistan, Kashmir, Himalaya Mts, 30 km N Murree, Ayubia, 73°24'03"E, 34°01'75"N, 2,650 m, 5–6. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 1 ♀, same locality, near Nathia Ghali, Ayubia village, 2,600 m, 22–25. x. 1998, leg. Gy. M. László & G. Ronkay (TTM); 2 ♂, same locality, 2,800 m, 10. vii. 2000, leg. Z. Varga & G. Ronkay (ZFMK); 2 ♀, Pakistan, Himalaya Mts, Valley of Indus, between Chilas and Dassu, Motel Barseen, 1,100 m, 10. x. 1998, leg. Gy. M. László & G. Ronkay (TTM); 1 ♂ 3 ♀, Pakistan, Azad Jammu & Kashmir, Thunian, 2,300–2,700 m, 25–30. viii. 2004, leg. V. Gurko, Ratzel slides nos GU2505/1w, GU/2505/2m (coll. Ratzel).

***Eupithecia pannosa* Mironov & Galsworthy, sp. n. (Fig. 3)**

Diagnosis. Wingspan 19.5–20 mm, fore wing 10–11 mm. Fore wing rather elongate and narrow, with slightly arched costal margin, oblique, evenly curved terminal margin and pointed apex; ground colour dark grey; transverse lines (basal, antemedian, median and postmedian) rather inconspicuous, oblique, sharply angled near costa; veins along postmedian line, especially  $M_1$ ,  $M_2$  and  $CuA_2$  covered with black scales; a narrow subapical ginger streak, and a longer, broader ginger streak stretching from below discal dot to terminal line, much more prominent in some specimens than others; a pale wavy subterminal line forming a small whitish tornal spot; terminal line broad, black, interrupted by veins; discal dot large, narrow and elongate, intensely black. Fringes chequered dirty white and blackish grey. Hind wing slightly elongate with narrow apex and shallow hollow on the terminal margin near apex; ground colour dirty white in anterior half and grey in posterior half along anal and terminal margins and at tornus; transverse lines inconspicuous; postmedian line evenly curved, forming a series of short dark dashes on the veins; discal dot paler, narrow and elongated; terminal line and fringes as fore wing.

Male genitalia (Fig. 19). Valves broad and rounded with evenly curved apex; sacculus lightly sclerotized, with a rounded tongue-like projection at apex; vinculum broad, trapezoidal, with a deep hollow at apex; uncus biapical, very deep, shaped like the prow of a Greek trireme; papillae on anterior arms of labides short, slightly curved and tapered to apices, covered with sparse setae. Aedeagus long and very slim, slightly sinuous, almost equal to length of valve; vesica wrinkled, armed apically with two small curved plates with common base, with one narrow, elongate and twisted V-shaped plate, and a small twisted knot of sclerotization at base. Sternite A8 elongate, broadest about one third from base, narrowing in a sinuous curve to apex, which is lightly sclerotized into two rods; basal hollow marked.

Female genitalia (Fig. 20). Bursa copulatrix large, almost globular, completely covered with dense, small spines. Ductus bursae short and narrow, membranous, slightly inclined, with a small rounded patch of small spines. Ductus seminalis strongly broadened in medial part, broadly attached to ductus bursae from right side. Colliculum collar-like, short and narrow. Antrum elongate, narrow, heavily sclerotized, covered with transverse and longitudinal wrinkles, especially near its posterior border. Tergite A8 small, trapezoid, slightly broadened at base, with sclerotized anterior margin and small medial process in posterior margin. Anterior and posterior apophyses relatively short and thin, tapered to apices. Papillae anales rather short and broad, rounded, covered with setae.

Similar species. This species belongs to the *lariciata* group. It is very similar externally to *E. lariciata* (Freyer, 1842), but clearly distinguished from this latter by the elongate discal spots on the fore wings and the paler, dirty white colour of the anterior half of the hind wings. The distinctively shaped plate at the apex of the aedeagus is diagnostic in the male

genitalia. In the female, the combination of the patch of small spines in the ductus bursae, the strongly broadened ductus seminalis, and the distinctive wrinkled antrum is unique in the group.

Holotype. ♀, Pakistan, Kashmir, Himalaya Mts, Deosai Mts, Bubin village, 74°59'E, 35°12.6'N, 3,150 m, 11–13. v. 1998, leg. Gy. M. László & G. Ronkay (TTM). Paratypes. 1 ♀, same locality and date (TTM); 1 ♀, Nepal, Ganesh Himal, 3,050 m, 8 km W Godlang, 85°17'E 28°10'N, 14. x. 1995, leg. L. Peregovits & L. Ronkay (coll. László); 1 ♂, India, Kumaon, Himalaya, Bhimtal, 1,500 m, 21–24. iii. (19)81, leg. Smetacek (ZFMK); 1 ♂, Kashmir, Gulmarg, 8. vi. 31, Fletcher coll., Geom slide no 22018 (originally syntype of *E. lariciata mesodeicta* Prout—see below) (BMNH); 1 ♀, Nepal, Kathmandu, 1,300 m, 21. x. 1986, leg. S. Sakurai, Geom slide no 21547; 1 ♀, Kathmandu, Godavari, 1,600 m, 26. iii. 1992, leg. M. S. Limbu; 1 ♀, India, Darjeeling, 6 mile Village, 2,050 m, 25. iii. 1986, leg. W. Thomas, Inoue slides nos 15942 and 14161, all three bearing labels “*Eupithecia atrisignis* Butler det. H. Inoue 2000” (BMNH).

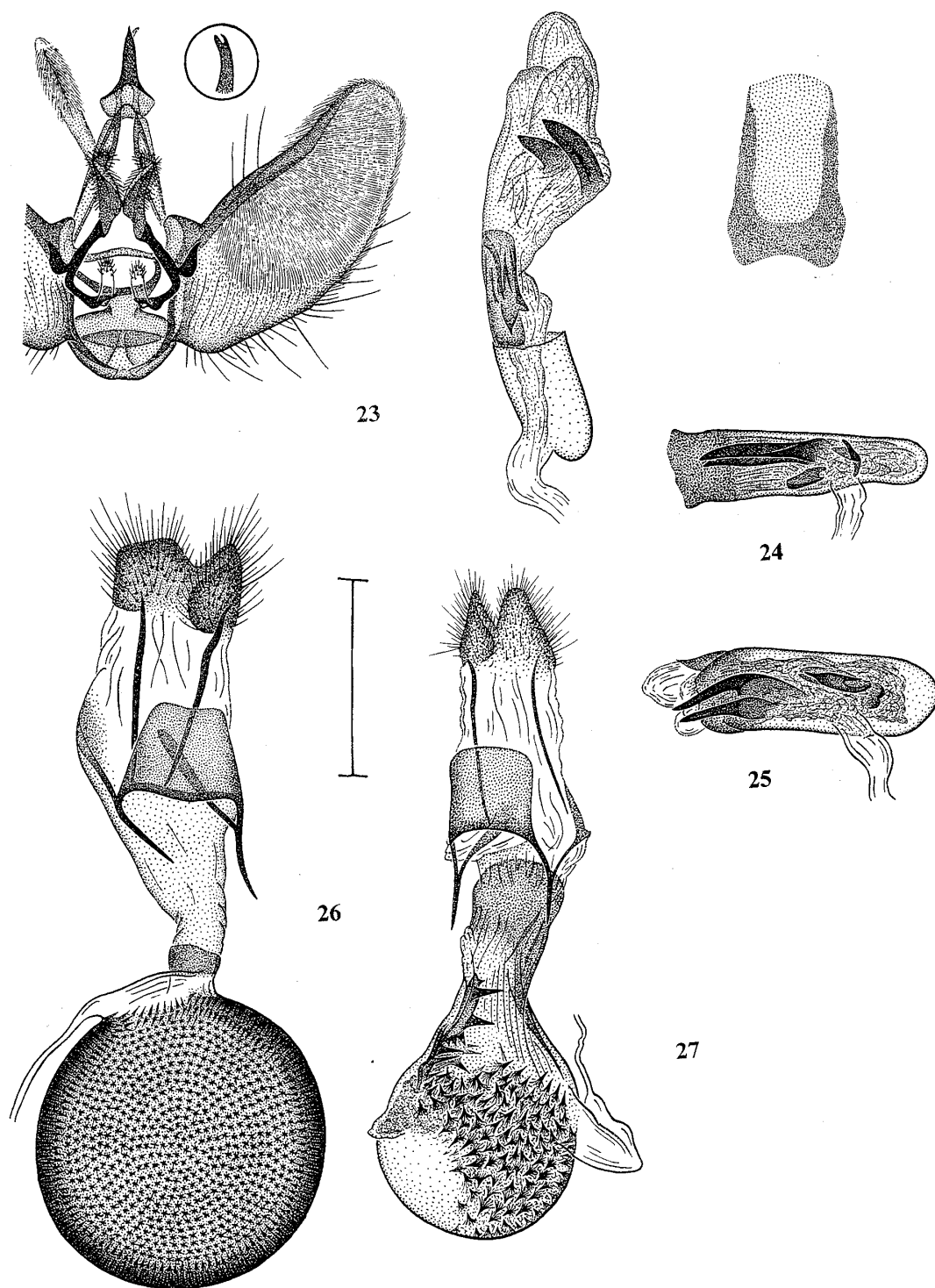
Remarks. Females of this species were erroneously attributed by Inoue (2000, plate 165, fig. 8) to *E. atrisignis* Butler, 1889. Galsworthy and Mironov (2005, fig. 27) subsequently compounded the confusion by wrongly attributing the same specimens to *E. sola* Vojnits, 1983.

***Eupithecia vetula* Mironov & Ratzel, sp. n. (Fig. 4)**

Diagnosis. Wingspan 16–20 mm, fore wing 8.5–9.5 mm. Fore wing rather elongate and narrow with slightly arched costa, oblique teminal margin and pointed apex. Ground colour blackish grey; transverse lines inconspicuous; median line obliquely sinuate, sharply angled behind discal dot onto costa; veins along postmedian line covered with black scales; pale wavy subterminal line slightly broadened near tornus; terminal line narrow, black, interrupted by veins; discal dot relatively large, ovoid, intensely black. Fringes chequered pale grey and blackish grey. Hind wing slightly elongate with narrow apex and shallow hollow on terminal margin near apex; ground colour pale grey, darker to blackish grey at tornus and along anal and terminal margins; transverse lines inconspicuous; postmedian line evenly curved, forming a series of short dark dashes on the veins; discal dot paler and smaller, usually narrow or ovoid; terminal line and fringes as on the fore wing.

Male genitalia (Fig. 28). Uncus stout, relatively short and thick, tapered to apex, its tip bi-apical. Valve large, elongate, slightly curved, with almost parallel dorsal and ventral margins, broadly rounded apex and a short, spine-like process on the ventral margin at about one third; sacculus sclerotized. Vinculum short and relatively narrow, trapezoid, with shallow medial hollow. Papillae on the anterior arms of labides elongate and thin, almost completely covered with sparse short setae. Aedeagus tapered to anterior end, slim and elongate, shorter than length of valve. Vesica covered with numerous minute spinules in apical part; armed with two narrow, elongate sclerotized bands with very small, stout, heavily sclerotized apical spines (two on one band and one on the other) and also with one smaller, elongate, irregular cornutus near ductus ejaculatorius base. Sternite A8 peg-like, broadened near base and narrowed to apex, with two very small, slightly expanded and blunt apical horns and narrowly sclerotized lateral margins near apex; basal and apical hollows shallow.

Female genitalia (Fig. 21). Bursa copulatrix small, globular, completely covered with dense small spines. Ductus bursae membranous, spineless, elongate and relatively narrow. Ductus seminalis broadened at base, attached to basal part of ductus bursae. Colliculum collar-like, short and narrow. Antrum campaniform, sclerotized, densely covered with nu-



Figs 23–27. Male and female genitalia of *Eupithecia* species (scale bar=1 mm: male with sternite A8, and lateral view of uncus enlarged). 23. *E. rajata* Guenée, male. 24. *E. particeps* Vojnits, male aedeagus. 25. *E. lobbichlerata* Schütze, male aedeagus. 26. *E. mesodeicta* Prout, female. 27. *E. pusillata kashmirica* Mironov & Ratzel, subsp. n., female.

merous pores, especially along lateral margins. Tergite A8 small, rectangular, wider than long, with narrowly sclerotized anterior margin and rounded posterior corners. Anterior and posterior apophyses thin, tapered to apices. Papillae anales relatively large, rounded, covered with long and some shorter setae.

Similar species. *E. vetula* belongs to the *lariciata* group and is very similar externally to the previous species, *E. pannosa* Mironov & Galsworthy. It is however slightly smaller with ovoid discal spots on the fore wings. The ground colour and pattern on all wings are as in *pannosa*. The small, spine-like process on the ventral margin of the valve and the two dentate apical cornuti on the vesica in the male genitalia are distinctive and diagnostic. The female genitalia are very similar to those of *E. conjunctiva* Hampson, 1895, but the latter has a longer colliculum, and a patch of spines in the ductus bursae opposite the point of attachment of the rather broader ductus seminalis.

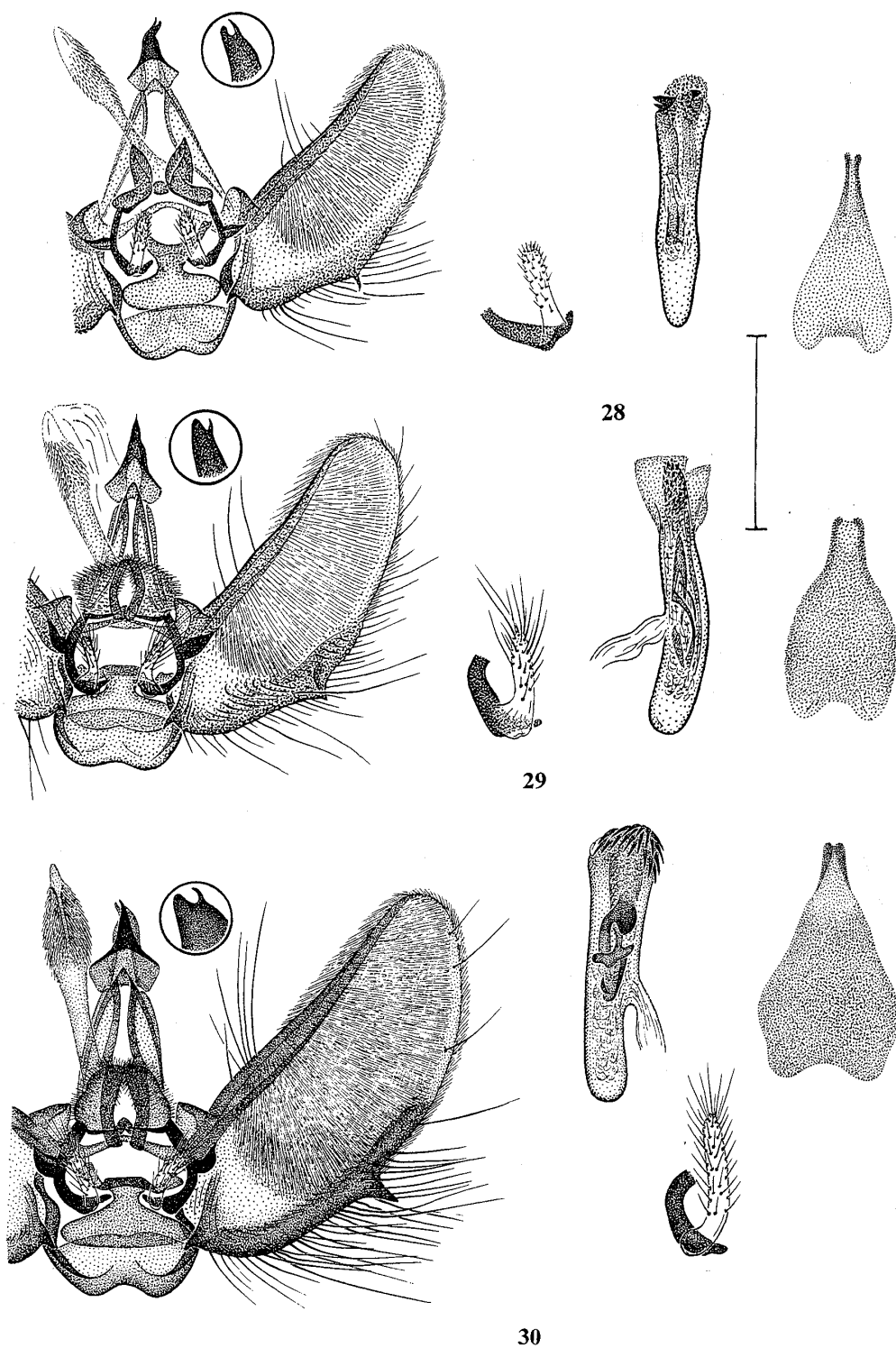
Holotype. ♂, Pakistan, Azad Jammu & Kashmir, Thunian, 2,300–2,700 m, 25–30. viii. 2004, leg. V. Gurko, Ratzel slide no GU185053m (SMNK). Paratypes. 8 ♂ 24 ♀, same locality, Ratzel slides nos GU18505/1m, GU18505/2w, GU18505/3m, GU21505/1w, GU21505/2w, GU22505/2w, GU25505/1w, GU25505/3w, GU27505/1m (SMNK, coll Ratzel, BMNH); 1 ♀, [India], Bhimtal, distr. Nainital, Kumaon–Himalaja, 1,500 m, 10–22. ix. (19)86, leg. A. Hauenstein (ZFMK); 1 ♀, Pakistan, SW-Himalaja. Indus-Kohistan, Kaghanatal, Naran, 3,200–3,400 m, 16. vii–5. viii. 1977, leg. De Freina, Ratzel slide 4507/4w (SMNS); 1 ♀, Pakistan, Himalaya Mts, Kaghan valley, Tathabaya, 73°26'E, 34°36'N, 2,200 m, 1. v. 1998, leg. Gy. M. László & G. Ronkay (TTM); 2 ♀, Pakistan, Himalaya Mts, Valley of Indus, between Chilas and Dassu, Motel Barseen, 1,100 m, 10. x. 1998, leg. Gy. M. László & G. Ronkay (TTM).

***Eupithecia firmata* Mironov & Ratzel, sp. n. (Fig. 5)**

Misidentification: *atrisignis* Inoue, 2000, *Tinea* **16** (Suppl. 1): 29, pl. 165, fig. 8; fig. 1329 [females only] (*nec* Butler, 1889); *sola* Galsworthy & Mironov, 2005, *Trans. Lapid. Soc. Japan* **56**: 223, fig. 27 [females only] (*nec* Vojnits, 1983).

Diagnosis. Wingspan 16–22 mm; fore wing 8.5–11 mm. Fore wing with rather straight costa, evenly curved termen and rather pointed apex; ground colour grey; transverse lines narrow, oblique, sharply angled near costa; inner half of medial area between antemedian and median lines slightly darker; postmedian line broad, black, sharply angled onto costa; terminal area with three lighter, often gingery, blotches (apical, medial and terminal); discal dot ovoid, intensely black; terminal line narrow, black; fringes clearly chequered dirty white and grey or dark grey. Hind wing lighter, pale grey; dark transverse lines fine; postmedian line usually forming a series of dark, blackish dashes on the veins; terminal area darker, grey, narrow with fine, whitish wavy subterminal line; discal dot smaller and paler, dark grey, ovoid or circular, terminal line and fringes as fore wing.

Male genitalia (Fig. 29). Uncus large, elongate, broad, but sharply tapered and pointed to apex, biapical. Valve large, elongate, slightly curved, with almost parallel dorsal and ventral margins, and with broadly rounded apex; sacculus heavily sclerotized and with a pointed process on ventral margin at about one third. Vinculum short and relatively narrow, trapezoid, with shallow medial hollow. Papillae on the anterior arms of labides elongate, thin, slightly curved, almost completely covered with short setae and long setae at the apices only. Aedeagus long and very thin, slightly curved, shorter than length of valve. Vesica armed with one apical dense patch of small spines, like a scobinate plate, with one medial, long, narrow, twisted, V-shaped cornutus and one smaller, short and broad plate-like cornutus near ductus ejaculatorius base. Sternite A8 elongate, broadened medially, slightly



Figs 28–30. Male genitalia of *Eupithecia* species (scale bar=1 mm: males with sternite A8, and lateral view of uncus and papillae on the anterior arms of labides enlarged). 28. *E. vetula* Mironov & Ratzel, sp. n. 29. *E. firmata* Mironov & Ratzel, sp. n. 30. *E. mesodeicta* Prout.

narrowing at base and sharply narrower at apex, with two very small, blunt apical horns and narrow heavily sclerotized lateral margins near apex; basal and apical hollows shallow.

Female genitalia (Fig. 22). Bursa copulatrix large, globular, completely covered with small dense spines. Ductus bursae short and narrow, membranous, with a patch of small spines. Ductus seminalis broadened at base, attached to ductus bursae from right side. Colliculum collar-like, short and narrow. Antrum elongate, narrow, lightly sclerotized with a small medial patch of pores and heavily sclerotized lateral margins. Tergite A8 relatively small, trapezoid, slightly broadened at base, with rounded posterior corners. Anterior and posterior apophyses thin, tapered to apices. Papillae anales rounded, covered with elongate setae.

Similar species. *E. firmata* belongs to the *lariciata* group. It is similar externally to *E. lariciata* (Freyer, 1842), but distinguished from it usually by the bolder black postmedian line on the fore wing, and the gingery cast to parts of the fore wing. It is also similar in size and pattern to *E. conjunctiva* Hampson, 1895, but generally darker, and with heavier transverse lines. The slimmer (especially laterally) uncus and absence of a thin horn-like cornutus on the vesica in the male genitalia distinguish the male genitalia from those of *E. lariciata*. The aedeagus vesica in *conjunctiva* is armed with a much more prominent patch of large spines at the apex. In the female genitalia, the shorter ductus bursae with a patch of small spines, the presence of a short and narrow collar-like colliculum and the elongate, narrow and sclerotized antrum in the female genitalia separate it from *lariciata*. The female genitalia are very similar to those of *conjunctiva*, but the ductus seminalis is narrower, and the antrum posterior to the colliculum relatively rather longer.

Holotype. ♀, Pakistan, Azad Jammu & Kashmir, Thunian, 2,300–2,700 m, 25–30. viii. 2004, leg. V. Gurko, Ratze slide no 21505/4w (SMNK). Paratypes. 2 ♂ 10 ♀, same locality, Ratze slides nos GU20505/1w, GU21505/4w, GU22505/1w, GU25505/4m, GU26505/1w, GU26505/3w, GU61204/1m (SMNK, coll Ratze); 1 ♀, Indien, J & K, vic. Gund, ca 2,200 m, 14. viii. 1988, leg. W. Thomas (ZFMK); 1 ♀, Indien, Kaschmir, Umg. Srinagar, 1,800 m, 2. viii. 1981, leg. W. Thomas, Ratze slide no GU2905/1w (SMNS); 1 ♀, Indien, Kaschmir, Gulmarg, 2,800 m, 9, 10. viii. 1980, leg. W. Thomas, Ratze slide 4507/3w (SMNS); 2 ♂ 2 ♀, Pakistan, Himalaya Mts, Kaghan valley, 20 km NE Balakot, Tathabaya, 73°25'E, 34°41'N, 2,400 m, 25 and 27. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM); 1 ♀, Kaghan Valley, Tathabaya, 2,300 m, 73°27'01'E 34°36'48"N, 22–23. vii. 1998, leg. G. Csorba & Ronkay, slide ACG GL61 (coll. László); 1 ♀, Nord Indien, Himachal Pradesh, Kullu Valley, Manali, 2,000 m, 23/27. viii. 1994, leg. P. Kautt & V. Weisz (ZMKU); 1 ♀, Pakistan, Kashmir, Himalaya Mts, 30 km N Murree, near Nathia Ghali, Ayubia vill., 2,600 m, 10. vii. 2000, leg. Varga & Ronkay (ZFMK); 3 ♀, W. Nepal, Karnali, Jumla District, Jumla, 2,440 m, 19–20. ix. 1981, leg. M. Owada; 1 ♀, Nepal, Dhunche, 1,960 m, Langtang Himal, Bagmati Zone, 15. viii. (19)93, leg. Hideo Nakajima, respectively Inoue slides nos 16955, 14126, 14184, 15941, all four bearing labels "*Eupithecia atrisignis* Butler, det H. Inoue, 2000" (BMNH); 1 ♀, Nepal, Langtang, 5 km NNE of Dunche, 85°18'E 28°08'N, 1,835 m, 16. ix. 1994, leg. M. Hreblay & T. Csóvári, Ratze slide 6507/2w (SMNS).

Remarks. Females of this species were erroneously attributed by Inoue (2000, fig. 1329) to *E. atrisignis* Butler, 1889. Galsworthy and Mironov (2005, fig. 26) subsequently compounded the confusion by wrongly attributing the same specimens to *E. conjunctiva* Hampson, 1895.

***Eupithecia mesodeicta* Prout, 1938, stat. n. (Fig. 6)**

*Eupithecia lariciata mesodeicta* Prout, 1938, in Seitz, *Macrolepid. Wld* **4** (Suppl.): 208, pl. 18: e.

*Eupithecia aspectabilis* Inoue, 1996, *Trans. lepid. Soc. Japan* **47**: 238, figs 3, 4, 9, 12. **Syn. n.**

Prout described *mesodeicta* as a subspecies of *E. lariciata*, though he indicated in his text that he thought it might be specifically separate. Having examined a very long series from the area, we are convinced that this is a separate species, though belonging to the *lariciata* group. Externally *mesodeicta* is easily distinguished by the very obvious pale fascia on the fore wing. In the male genitalia (Fig. 30), the valves are similar to those of *lariciata*, though the ventral protrusion is narrower. The aedeagus differs in lacking the hornlike cornutus of *lariciata*, the cornuti on the vesica being reduced to two rather lightly sclerotized plates. There is a small patch of spines at the apex. Sternite A8 is more evenly tapered towards the posterior end, where there are two more distinct rods. The female genitalia (Fig. 26) are immediately distinguishable by the presence in *mesodeicta* of a colliculum, absent in *lariciata*. In addition, the latter has a long ductus bursae, and an abruptly flared antrum, whereas the former has a very short ductus, and an elongate, gradually widening antrum, armed with a large field of microspines.

Examined type material. ♂, [India], Kashmir, Gulmarg, 6. vii. 31, Fletcher coll, *Eupithecia mesodeicta* Prout, ♂ type, Geom. slide no 1937/327 (now no 21998) lectotype, here designated; 3 ♀, same locality, 17. vi. 31, 17. vii. 31, 28. vii. 31; 1 ♀, Scind Valley, June 1887, J. H. Leech, Leech coll. 1900-64, BM Geom. slide no 22019 (syntypes, BMNH); ♂, NW India, Kashmir, Pahalgam-Kolohoi, Aru (2,800 m), 10. viii. 1982, leg. H. Yoshimoto, Inoue slide no 14171, BM Geom. slide no 19215 (holotype of *E. aspectabilis*, coll. Inoue in BMNH).

Recent material. 1 ♀, Kashmir, Taobat, Kishenganga v., 7,400 ft., 16. vi. (19)42 (coll. Wiltshire in BMNH); 1 ♀, Kashmir, Badwan Gurais, 7,900 ft., 21. vi. (19)42 (coll. Wiltshire in BMNH); 1 ♀, NO-Pakistan, Murree, 1,700 m, 24. vii. 1975, leg. W. Thomas (coll. Sommerer); 1 ♀, Pakistan, Kaghan, Naran, 2,400 m, 26-27. vii. 1975, leg. W. Thomas (coll. Sommerer); 1 ♂, Pakistan, SW-Himalaja, Indus-Kohistan, Kaghanal Naran, 2,400-3,000 m, 3-13. vi. (19)77, leg. de Freina (coll. Sommerer); 1 ♀, Indien, J+K, Ladakh, Tangol, 3,100 m, 22-26. vii. (19)80, leg. W. Thomas, Lep1997-11 (SMNS); 2 ♀, Indien, J & K, Ladakh, Namika-La-Pass, 3,700 m, 28. vii. 1980, leg. W. Thomas (SMNS); 2 ♀, Indien, Lahoul, Rohtang-Paß, 3,000 m, 29. vi. 1981, leg. W. Thomas, Lep1997-11, Ratzel slide 18307/1m+ 3m (SMNS); 2 ♀, Indien, J & K, Baltal bei Sonamarg, 3,000 m, 1. vii. 1981, leg. W. Thomas (SMNS); 2 ♀, Pakistan, Gilgit, Naltar, 3,000-3,200 m, 19-23. viii. 1982, leg. Eckweiler, Ratzel slide no GU3905/2w, Lep1997-11 (SMNS); 1 ♀, Indien, J & K, Kashmir, Daksun, 2,300 m, 6-7. vii. 1987, leg. W. Thomas (ZFMK); 1 ♂ 1 ♀, same locality, Sonamarg, 2,700 m, 10-11. vii. 1987, leg. W. Thomas (ZFMK); 1 ♀, same locality, Gund, 2,200 m, 29. vii. 1987, leg. W. Thomas (ZFMK); 1 ♂ 1 ♀, Pakistan, Himalaya Mts, Kaghan valley, 12 km E of Naran, Battakundi, 73°40'E, 34°57'N, 3,200 m, 26. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM); 1 ♂ 2 ♀, same locality, Tathabaya, 73°26'E, 34°36'N, 2,200 m, 1. v. 1998, leg. Gy. M. László & G. Ronkay (TTM); 3 ♀, same locality, 73°25'91"E, 34°35'33"N, 2,150 m, 9. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 1 ♀, Pakistan, Himalaya Mts, Valley of Indus, between Chilas and Dassu, Motel Barseen, 73°12'20"E, 35°21'42"N, 1,100 m, 15. v. 1998, leg. Gy. M. László & G. Ronkay (TTM); 1 ♂, same locality, 21. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 2 ♀, Pakistan, Karakoram Mts, Naltar valley, 74°09'22"E, 36°11'08"N, 2,900 m, 20. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 1 ♀, Pakistan, Kashmir, Himalaya Mts, Deosai Mts, Bubin village, 74°59'E, 35°12.6'N, 3,150 m, 1-2. vii. 2000, leg. Z. Varga & G. Ronkay



(ZFMK).

Remarks. Prout's original description lists 5 males: however on examination, 3 of these turned out to be females. The remaining two males proved on dissection to belong to two different species. We therefore select the male specimen originally dissected by Prout, which is conspecific with the three females, as lectotype, in order to ensure the stability of the species. The remaining male is cited above as a paratype of *pannosa* sp. nov.

Vojnits in his joint publication with De Laever (1978) included line drawings which he stated to be the male and female genitalia of *E. lariciata mesodeicta* Prout, 1938 on the basis of three specimens from Korea. However, after examination of Korean material in the Budapest Museum, we are confident that these specimens belong not to *mesodeicta*, but to the widespread and common *E. lariciata* (Freyer, 1842).

***Eupithecia nepalata* Schütze, 1961 (Fig. 7)**

*Eupithecia nepalata* Schütze, 1961, *Veröff. zool. StSamml. Münch.* **6**: 179, pl. 29, figs 1, 6; pl. 30, figs 1, 1a, 1b, 2.

*Eupithecia abundeli* Vojnits, 1988, *Annls hist.-nat. Mus. natn. hung.* **80**: 83, pl. 2, figs 13, 14; pl. 6, figs 41–44. **Syn. n.**

*Eupithecia petrensis* Mironov, 1989, *Ent. Obozr.* **68** (2): 371, figs 9–11. **Syn. n.**

Not previously recorded from Pakistan or India.

Examined type material. ♂, Nepal, Mustangbhot, 29°11'N, 83°58'E, Kehami, 3,700 m, 12. viii. (19)55. leg. F. Lobbichler, ZSM slide no G3892 (holotype, ZSM); ♀, [Tajikistan], Pamir, Schach-Darensis Mts, Cliv. Sept., fl. Badjond-Dara, 3,500 m, 31. vii. 1961, (leg.) Bundel, Vojnits slide no 17689 (holotype of *E. abundeli*, ZISP); ♂, Tajikskaya SSR [Tajikistan], Khorog, Botanical Garden, 24. vii. 1958, leg. A. Tzvetajev (holotype of *E. petrensis*, ZMMU); 1 ♂, [China], Nord Yunnan, A-tun-tse [Deqing], Obere Höhe, ca 4,500 m, 12. viii. 1936, H. Höne, Vojnits slide no 12465 (labelled as holotype of unpublished *E. tranquilla* Vojnits; ZFMK).

Recent material. 1 ♂ 3 ♀, Indien, Lahoul, Koksar, ca 3,000 m, 16, 17. vii. 1980, leg. W. Thomas, Lep1997-14 (SMNS); 1 ♂, same locality, Rohtang-Paß, 3,000 m, 17–18. vii. 1980, leg. W. Thomas, Ratzel slide no GU2905/4m (SMNS); 1 ♀, Indien, J & K, Ladakh, Khardung La, 4,500 m, 7. viii. 1988, leg. W. Thomas (ZFMK); 1 ♂, Pakistan, Hindukush Mts, 5 km E of Shandur pass, 72°32'E, 36°10'N, 3,500 m, 13. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM); 3 ♀, Pakistan, Himalaya Mts, 8 km SW Astor, 74°46'E, 35°16'N, 3,000 m, 18. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM); 1 ♂ 4 ♀, same locality, 12 km SW Astor, Rama lake, 74°43'E, 35°16'N, 19–20. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM); 1 ♂ 5 ♀, Pakistan, Himalaya Mts, 5 km S of Deosai Pass, 75°31'E, 35°16'N, 2,800 m, 21. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM); 1 ♀, Pakistan, Karakoram Mts, Huru-Hispar valley, 74°42'E, 36°15'N, 23. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM); 9 ♀, Pakistan, Himalaya Mts, Kaghan valley, 12 km E of Naran, Battakundi, 73°40'E, 34°57'N, 3,200 m, 26. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM); 2 ♂, Pakistan, Himalaya Mts, Kashmir, Deosai N. P., Deosai Plains, 75°12'14"E, 35°00'43"N, 3,950 m, 15. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 1 ♂, Pakistan, Karakoram Mts, Naltar valley, 74°09'22"E, 36°11'08"N, 2,900 m, 20. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 1 ♀, Pakistan, Kashmir, Himalaya Mts, Deosai Mts, Bubin village, 75°02'E, 35°13.5'N, 3,300 m, 6. vii. 2000, leg. Z. Varga & G. Ronkay (ZFMK); 1 ♂, Pakistan, Karakoram Mts, Naltar valley, 74°12'E, 36°09.6'N, 2,800 m, 8. vii. 2000, leg. Z. Varga &

G. Ronkay (ZFMK); 1 ♀, Pakistan, Deosai Mts, near Chilim, 3,500 m, 17. viii. 2004, leg. V. Gurko, Ratzel slide no GU11705/2w (coll. Ratzel); 1 ♀, Pakistan, Karakoram Mts, Naltar Valley, 12 km NW of Nomal, ca 2,000 m, 74°10'E 36°09'N, 16. vii. 1994, leg. B. Herczig, Gy. M. László, & G. Ronkay, slide no ACG GL19 (coll. László).

***Eupithecia acutangula* Hampson, 1895 (Fig. 8)**

*Eupithecia acutangula* Hampson, 1895, *Fauna Br. India* (Moths) **3**: 400.

Not previously recorded from Kashmir. There are at least two generations of this species; the single known specimen of the second brood is smaller, with narrower wings than adults of the first brood. The male of *E. acutangula* was previously unknown. We therefore include a description and illustration of the male genitalia.

Male genitalia (Fig. 31). Uncus short, stout, biapical. Valve elongate, with a medially bowed dorsal margin, and a narrow, upturned curved apex; sacculus heavily sclerotized with a pointed, thorn-like process at the apex. Vinculum rounded. Papillae on anterior arms of labides elongate, thin, clavate, covered by setae. Aedeagus relatively stout and elongate, but shorter than length of valve. Vesica armed with a noose-shaped row of some 14–15 horn-like cornuti, the apical cornuti smaller than the others, and with one slim, twisted, V-shaped cornutus and another smaller irregular cornutus, both close to the ductus ejaculatorius base. Sternite A8 large, peg-like, broadened near base and sharply tapered to apex, with a heavily sclerotized pointed tip; basal hollow broad and deep.

Remarks. The male genitalia of *E. acutangula* are similar to those of *E. vivida* Vojnits & De Laever, 1978 (Fig. 32), but are easily distinguished from it by the pointed rather than rounded process on the ventral margin, and the different arrangement of cornuti in the aedeagus vesica. Both species belong to the *egenaria* species group.

Examined type material. ♀, [India], Dalhousie, 92-98. Harford Coll., 5/5/(18)91, *Eupithecia acutangula* Hmps. type ♀, BM Geom. slide no 20206 ♀ (holotype, BMNH).

Recent material. 1 ♂, Pakistan, Himalaya Mts, Kaghan valley, 20 km NE Balakot, Tathabaya, 73°25'E, 34°41'N, 2,400 m, 25. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM); 1 ♂ 1 ♀, same locality, Tathabaya, 73°26'E, 34°36'N, 2,200 m, 1. 16. v. 1998, leg. Gy. László & G. Ronkay (TTM).

***Eupithecia vivida* Vojnits & De Laever, 1978, sp. rev.**

*Eupithecia vivida* Vojnits & De Laever, 1978, *Acta zool. Acad. Sci. hung.* **24**: 238, figs 18, 20.

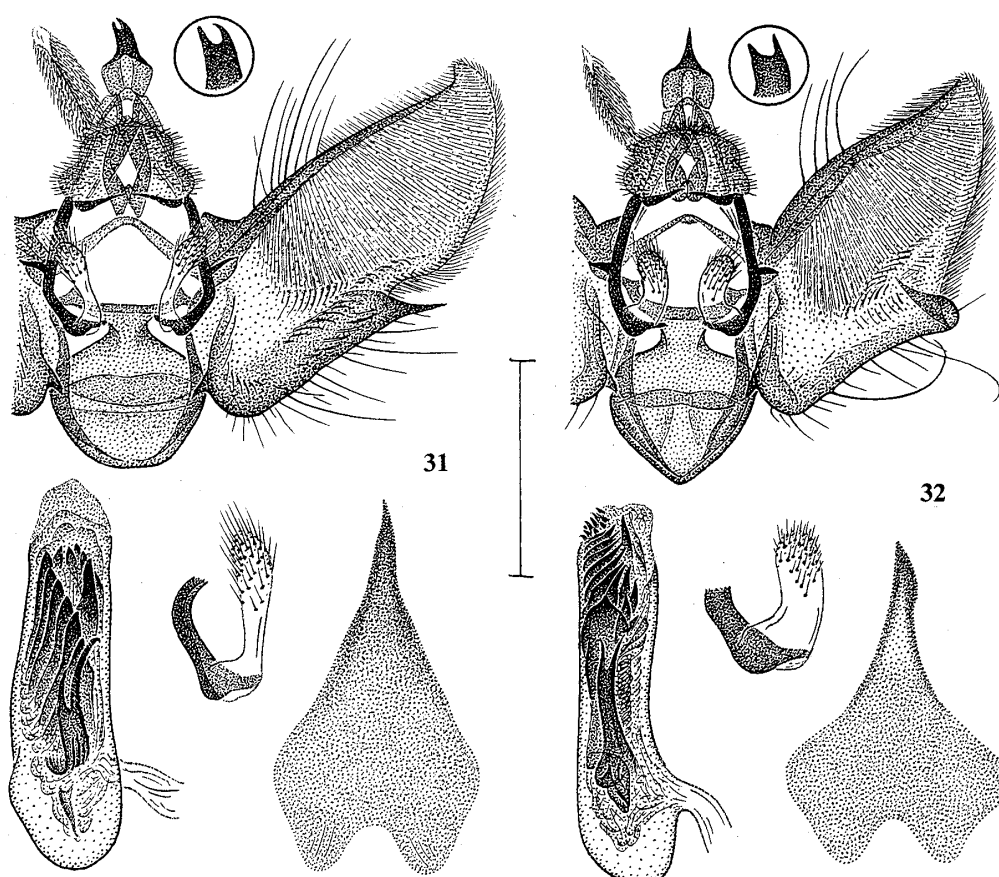
*Eupithecia wolffi* Vojnits, 1985, *Acta zool. hung.* **31**: 272. [Replacement name for *producta* Vojnits, 1981].

**Syn. n.**

*Eupithecia producta* Vojnits, 1981, *Annls hist.-nat. Mus. natn. hung.* **73**: 222, fig. 3. Junior primary homonym of *Eupithecia producta* Bastelberger, 1911.

The male genitalia of this species are illustrated here (Fig 32) for comparison with the male genitalia of *E. acutangula* Hampson, 1895. The habitus and male and female genitalia were illustrated in Inoue (2000) as *E. quadripunctata*.

Examined type material. ♀, China, Provinz Nord-Yuennan, Li-kiang, X, 17. iii. 1935, H. Höne, Vojnits slide no 11057 (holotype, ZFMK); ♀, Nord-Indien/Kumaon, Bhimtal (Nainital), 1,450 m, 23. ix. 1973, Lichtfang, leg. S. Richter, Vojnits slide no 12124 (holotype of *E. wolffi* [= *producta*], SMNK); 1 ♀, same locality, 21. ix. 1973, Lichtfang, leg. S. Richter, Vojnits slide no 12121 (paratype of *E. wolffi* [= *producta*], SMNK); 1 ♀, same locali-



Figs 31–32. Male genitalia of *Eupithecia* species (scale bar=1 mm: males with sternite A8, and lateral view of uncus and papillae on the anterior arms of labides enlarged). 31. *E. acutangula* Hampson. 32. *E. vivida* Vojnits.

ty, 6. ix. 1973, Lichtfang, leg. S. Richter, Vojnits slide no 12127 (paratype of *E. wolfi* [=producta], TTM).

Recent material. 1 ♀, Indien, Uttar Pradesh, 15 km N Joshimath Gangaria, ca 3,050 m, 27–30. vii. (19)93, leg. Kautt & Weisz, Ratzel slide no GU20905/2w (SMNS); 2 ♂ 12 ♀, Pakistan, Himalaya Mts, Valley of Indus, between Chilas and Dassu, Motel Barseen, 1,100 m, 10. x. 1998, leg. Gy. M. László & G. Ronkay (TTM, ZISP); 3 ♂ 3 ♀, same locality, 19. x. 1998, leg. Gy. M. László & G. Ronkay (TTM); 3 ♂ 1 ♀, Pakistan, Azad Jammu & Kashmir, Thunian, 2,300–2,700 m, 25–30. viii. 2004, leg. V. Gurko, Ratzel slides nos GU15805/2m, GU15805/3w (coll. Ratzel).

Remarks. This species was incorrectly synonymised with the following species by Inoue (2000). See discussion under the following species.

### *Eupithecia quadripunctata* Warren, 1888

*Eupithecia quadripunctata* Warren, 1888, *Proc. zool. Soc. Lond.* **1888**: 331.

*Eupithecia tricornuta* Inoue, 1980, *Bull. Fac. domest. Sci. Otsu Wom. Univ.* **16**: 153, figs 35, 36, 39A–D, 42A. **Syn. n.**

*Eupithecia abiecta* Vojnits, 1980, *Acta zool. Acad. Sci. hung.* **26**: 439, figs 7, 8, 20. **Syn. n.**

We have carefully compared extensive series of *E. tricornuta* (= *E. abiecta*) from Far

Eastern Russia (Priamurje and Primorje), Korea, Japan, the mainland of China (Shanxi, Shaanxi, Gansu, Hebei, Henan, Heilongjiang), and Taiwan, with the holotype of *E. quadripunctata* and specimens from Kashmir in modern material. We conclude that they belong to the same wide-ranging species. There are minor differences in the shape of the cornuti in the vesica (more sinuate in the Himalayan population), and of the eighth sternite (more parallel-sided in the Himalayan population, with longer apical points), but both elements are quite variable in both populations; however in other respects the genitalia of both sexes are very similar in all populations. Externally, the species is also very well distinguished from other related species by the lighter, ochreous, even rather brownish ochreous abdomen, both in the male and the female.

Examined type material. ♀, Thundiani 30/4/87, 87.162, *Eupithecia quadripunctata* n. sp., BM Geom. slide no 20119 (holotype, BMNH); ♂, [Japan], Nippara, Tokyo-To, 12. v. 1962, T. Ebato, BM Geom. slide no 16373 (holotype of *E. tricornuta*, BMNH); ♂, [China], Tapaishan im Tsinling, Sued-Shensi, ca 3,000 m, 11. viii. 1936, H. Höne, Vojnits slide no 12336 (holotype of *E. abiecta*, ZFMK).

Recent material. 1 ♂, Indien, J & K, Kashmir, Gund, 2,200 m, 29. vii. 1987, leg. W. Thomas (ZFMK); 1 ♂ 2 ♀, Pakistan, Azad Jammu & Kashmir, Thunian, 2,300–2,700 m, 25–30. viii. 2004, leg. V. Gurko, Ratzel slides nos GU2605/1w, GU2605/2m, GU29505/3w (coll. Ratzel); 1 ♀, Nepal, Kathmandu, Godavari 1,600 m, 27. iii. 1992, M. S. Limbu leg.; 1 ♀, E. Nepal, Kosi Basantapur, 2,350 m, 15–16. iii. 1993, T. Haruta & M. S. Limbu leg.

Remarks. Inoue (2000) listed *E. quadripunctata* from Nepal, and synonymised *E. vivida* Vojnits with it. This appears to have been based on a confusion about the holotype specimen of *quadripunctata*, as the female genitalia of *vivida* do not resemble those of the former. Externally the two species are however very similar. The specimens illustrated in Inoue (2000) are of *vivida* (plate 166, fig. 8, and figs 1315 and 1349). Almost all of the long series of specimens listed in the same work are *vivida*, but we did find two specimens of *quadripunctata* (listed above) among them.

### *Eupithecia anemica* Viidalepp, 1988 (Fig. 9)

*Eupithecia anemica* Viidalepp, 1988, *Fauna pyadenits gor Srednej Azii* [Geometridae fauna of the Central Asian mountains]: 127, pl. 2, fig. 20; text-pl. 28, figs 4, 5, 11, 12.

*Eupithecia anemica illustrata* Kaila & Viidalepp, 1996, in Kaila, Viidalepp, Mikkola & Mironov, *Acta zool. fenn.* **200**: 66, fig. 18.

This small species, which is rather similar externally to *E. conterminata* (Lienig & Zeller, 1846) had hitherto been recorded from the mountains of southern Kazakhstan, Uzbekistan, Kyrgyzstan and Tajikistan (Viidalepp, 1988; Kaila *et al.*, 1996, subsp. *illustrata* Kaila & Viidalepp). It has not been previously recorded from Pakistan. Both Himalayan specimens are worn, with only weak traces of discal dots on the fore wings and damaged fringes.

Examined type material. ♂, [Tajikistan] Tadzh. SSR, Zeravshansky Mts, Artuch, 2,200 m, 4. vi. 1980, at light, leg. Kruus (holotype, IAET).

Recent material. 2 ♀, Pakistan-West, Great Himalaya Mts, near Gabar, 3,200 m, 21–24. viii. 2004, leg. V. Gurko, Ratzel slides nos GU9705/1w, GU9705/2w (SMNK; coll. Ratzel).

***Eupithecia assectata* Dietze, 1904 (Fig. 10)**

*Eupithecia assectata* Dietze, 1904, *Dt. ent. Z. Iris* [1903] **16**: 346, pl. 3, figs 20, 21.

This species has hitherto been recorded from Uzbekistan, Kyrgyzstan and Tajikistan. It has not previously been recorded from Kashmir.

Examined type material. 1 ♂, *assectata* n. sp., Original (K. Dietze), Asia, Samarkand, Prep. Eu 72 Zool. Mus. Berlin; 1 ♀, Togus Tjurae, Kogard Tau, *assectata* n. sp. Type (syntypes, coll. Dietze in MNHU).

Recent material. 3 ♂ 1 ♀, N-Pakistan, Shandur pass, 72°32'E, 36°05'N, 3,600 m, 21. vi. 1992, leg. M. Hreblay & G. Csorba (TTM, ZISP); 1 ♂ 10 ♂, Pakistan, Hindukush Mts, 5 km E of Shandur pass, 72°32'E, 36°10'N, 3,500 m, 13. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM); 1 ♀, same locality, 72°38'E, 36°07'N, 3,250 m, 24–25. vi. 2000, leg. Z. Varga & G. Ronkay (ZFMK); 5 ♂ 19 ♂, same locality, 3,750 m, 26–27. vi. 2000, leg. Z. Varga & G. Ronkay (ZFMK, ZISP).

Remarks. This species was based on 7 syntypes from the collections of Bohatsch, Graeser, Dietze, Püngeler and Staudinger; localities were given as “Central Asia, Tura, Samarkand, Issyk-kul, Togus-torau”. We have seen the two syntypes detailed above, but not the rest of the type series, and therefore do not designate a lectotype pending examination of the rest. We base our concept of the species for the moment on these two syntypes.

***Eupithecia dzhirgatalensis* Viidalepp, 1988 (Fig. 11)**

*Eupithecia dzhirgatalensis* Viidalepp, 1988, *Fauna pyadenits gor Srednej Azii* [*Geometridae Fauna of the Central Asian Mountains*]: 124, pl. 2, fig. 11; text-pl. 27, fig. 8; text-pl. 28, fig. 1.

Not hitherto recorded from Kashmir.

Examined type material. ♀, Tajik. SSR [Tajikistan], SW Alai Mts, Dzhirgatal, 1,700 m, 3. viii. 1981, at light, leg. Talve & Keskkula (holotype, IAET).

Recent material. 1 ♂ 2 ♀, Pakistan, Kashmir, Himalaya Mts, Deosai Mts, Bubin village, 74°59'E, 35°12.6'N, 3,000 m, 16. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 1 ♀, same locality, 74°58'E, 35°12.6'N, 3,150 m, 19. vi. 1998, leg. Gy. Fábíán & B. Herczig (TTM); 1 ♂ 1 ♀, same locality, 75°02'E, 35°13.5'N, 3,300 m, 3. vii. 2000, leg. Z. Varga & G. Ronkay (ZISP); 4 ♂ 2 ♀, same locality, 3,150–3,300 m, 1–6. vii. 2000, leg. Z. Varga & G. Ronkay (ZFMK); 1 ♀, Pakistan, Himalaya Mts, Nanga Parbat area, Astor, Rama, 74°48'E, 35°21'N, 3,300 m, 13. vii. 1998, leg. G. Csorba & L. Ronkay (TTM).

***Eupithecia thermosaria* Hampson, 1903 (Fig. 12)**

*Eupithecia thermosaria* Hampson, 1903, *J. Bombay nat. Hist. Soc.* **14**: 644.

*Eupithecia jaani* Mironov, 1989, *Ent. Obozr.* **68**: 370, figs 5–8, 13. **Syn. n.**

Misidentification: *scortillata*: Viidalepp, 1988, *Fauna pyadenits gor Srednej Azii* [*Geometridae Fauna of the Central Asian Mountains*]: 118, pl. 1, fig. 18; text-pl. 29, figs 8, 9 (*nec* Dietze, 1904).

Examined type material. 1 ♀, [India], Kashmir, Thompson, Leech Coll. 1900–64, *Eupithecia thermosaria* Hmps. type ♀, BM Geom. slide no 11805; 1 ♀, Kokser, H McArthur coll., July 1888 (syntypes, BMNH); ♂, Tadzhikskaya SSR [Tajikistan]: Vanchsky Mts, Abdukagor Ravine, Dal'nee, 2,900 m, 9. viii. 1955, leg. A. Bundel (holotype of *E. jaani*, ZISP).

Recent material. 1 ♂, Indien, J & K, Ladakh, Kharbu, 2,800 m, 12. vii. 1987, leg. W. Thomas (ZFMK); 1 ♂, same locality, Miru, 3,700 m, 23. vii. 1987, leg. W. Thomas

(ZFMK); 3 ♂, same locality, Khardung La, 4,100 m, 5. viii. 1988, leg. W. Thomas (ZFMK); 3 ♂ 2 ♀, same locality, 4,500 m, 7. viii. 1988, leg. W. Thomas (ZFMK, ZISP); 1 ♂, Indien, Uttar Pradesh, 10 km ESE Gangotri, ca 3,800 m, 10–11. viii. 1993, leg. Kautt & Weisz, Ratzel slide no GU29805/3m (SMNS); 1 ♀, Indien (26), Himachal Pradesh, Spiti, Spiti Valley, 1 km NW Kaza, 3,550 m, 5. vii. (19)94, leg. P. Kautt & V. Weisz (ZMKU); 1 ♂, India, Uttar Pradesh, Garwhal Himal, Gangotri, 3,000 m, 25–26. viii. 1997, leg. L. Nádai (coll. László).

***Eupithecia robiginascens* Prout, 1926**

*Eupithecia robiginascens* Prout, 1926, *Novit. zool.* **33**: 9.

*Eupithecia captiosa* Vojnits, 1984, *Acta zool. Acad. Sci. hung.* **30**: 225, fig 17 (synonymised by Mironov & Galsworthy (2004)).

This appears to be a relatively common species throughout the Himalayan Range, but it has not hitherto been recorded from Pakistan. The habitus and male and female genitalia were illustrated in Inoue (2000).

Examined type material. ♂, Buxa, Bhutan, *Eupithecia robiginascens* Prout type ♂, BM Geom. slide no 20149 (holotype, BMNH); ♂, China, Provinz Nord-Yuennan, Li-kiang, 22. vii. 1935, H. Höne, Vojnits slide no 14185 (holotype of *E. captiosa*, TTM).

Recent material. 1 ♀, Indien, J & K, Kashmir, Gund, 2,200 m, 29. vii. 1987, leg. W. Thomas (ZFMK); 1 ♀, Indien, Himachal Pradesh, Kullu valley, oberh. Kullu, 31°57'N, 77°09'E, 1,500 m, 22. x. 1990, leg. H. Hacker (ZFMK); 1 ♂ 4 ♀, Indien, Uttar Pradesh, 15 km N Joshimath-Gangaria, ca 3,050 m, 27–31. vii. 1993, leg. Kautt & Weisz (SMNS); 1 ♀, Indien, Kaschmir, Gulmarg, 2,800 m, 9. 10. viii. 1980, leg. W. Thomas (SMNS); 1 ♂, Pakistan, Kashmir, Himalaya Mts., 30 km N Murree, Ayubia, 73°24'03"E, 34°01'75"N, 2,650 m, 5–6. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 6 ♀, Pakistan, Azad Jammu & Kashmir, Thunian, 2,300–2,700 m, 25–30. viii. 2004, leg. V. Gurko, Ratzel slides nos. 4505/3w, 29505/2w, 2605/3w (coll. Ratzel).

Remarks. Although Scoble *et al.* (1999) list type material of this species as “syntypes ♂, ♀”, Prout’s description refers to a specimen from Buxa, followed by the words “type in coll. Tring museum”. There is only a single male in the BMNH series which fits this description, and it bears the type label in Prout’s handwriting. In our opinion this specimen should be regarded as a holotype.

***Eupithecia particeps* Vojnits, 1988, sp. rev.**

*Eupithecia particeps* Vojnits, 1988, *Acta. zool. hung.* **34**: 41, figs 7-9; pl. 3, fig. G.

Misidentification: *lobbichlerata*: Inoue, 2000, *Tinea* **16** (Suppl. 1): 36, pl. 165, fig. 27; fig. 1304 (*nec* Schütze, 1961).

Not hitherto recorded from Pakistan.

Having examined the holotypes of both, we do not agree with Inoue’s (2000) judgement that *E. particeps* is a junior synonym of *E. lobbichlerata*. The two species are well distinguished externally. The male genitalia of *E. particeps* have a longer uncus, valve, aedeagus and eighth sternite than *lobbichlerata*. Furthermore the two horn-like cornuti in the vesica are longer and straighter than those on the vesica of *lobbichlerata*, one of which is characteristically curved and very uniform in all specimens examined. The aedeagus of *particeps* is illustrated at Fig. 24 and that of *lobbichlerata* at Fig. 25. The male genitalia figured in Inoue (2000), fig. 1304, as *lobbichlerata* are those of *E. particeps*: the female genitalia

figured as *lobbichlerata* in fig. 1344 are those of *E. albispumata* Warren; this reflects an incorrect attribution of the female in Schütze (1961), which we deal with under the following species. The female of *E. particeps* remains unknown.

Examined type material. ♂, E Nepal, Solukhumbu Sagarmatha, Ringmo, 2,780 m, 9. x. 1979, M. Owada, Vojnits slide no 14689 (holotype, NSMT).

Recent material. 1 ♂, Pakistan, Himalaya Mts, Kaghan valley, 20 km NE Balakot, Tathabaya, 73°25'E, 34°41'N, 2,400 m, 25. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM); 1 ♂, Pakistan, Azad Jammu & Kashmir, Thunian, 2,300–2,700 m, 25–30. viii. 2004, leg. V. Gurko, Ratzel slide no GU3905/4m (coll. Ratzel).

### *Eupithecia albispumata* Warren, 1893

*Eupithecia albispumata* Warren, 1893, *Proc. zool. Soc. Lond.* **1893**: 384, pl. 30, fig. 23.

*Eupithecia pengata* Schütze, 1961, *Veröff. zool. StSamml. Münch.* **6**: 180, pl. 29, figs 2, 7; pl. 30, figs 3, 3a, 3b; pl. 31, fig. 1. **Syn. n.**

*Eupithecia acseszteri* Vojnits, 1988, *Acta zool. hung.* **34**: 50, figs 30–32, pl. 1: C. **Syn. n.**

Misidentification: *lobbichlerata*: paratype females only, Schütze, 1961, *Veröff. zool. Stsamml. Münch.* **6**: 181, fig. 3; Inoue, 2000, *Tinea* **16** (Suppl. 1): 36, pl. 165, fig. 27; fig. 1344; *anteacta* Vojnits, 1984, *Acta zool. hung.* **30**: 543, fig. 62 (paratype ♀).

There are two specimens of this species from Kashmir in the BMNH series, but we have not seen any modern material from the western Himalayas. The species is widespread and apparently common in Nepal, the eastern Himalayas and SW China.

Type material examined. ♀, [India] Khasis, 6,000 ft., Sept 1886 H. J. Elwes, coll. H. J. Elwes, *Eupithecia albispumata* Warren Type ♀, BM Geometrid slide 20133 (lectotype, BMNH); ♂, Nepal, Mustangbhot, 29°11'N 83°58'E, Penga, 3,800 m, 8. viii. 55, leg. F. Lobbichler, *pengata* Schütze. Holotypus, Präp Nr 1746 ♂ det E. Schütze, Kassel (holotype, *E. pengata*); ♂, E. Nepal, Kharikhola, 1,980 m, Solukhumbu Sagarmatha, leg. M. Owada (holotype, *E. acseszteri*) (NSMT); ♀, Nepal, Kehami, 3,700 m, 20. viii. 55, Präp A712 (allotype, *E. lobbichlerata*) (ZSM); ♀, Li-kiang, North Yuennan, 9. ix. 1934, leg. H. Höne, Vojnits slide no 13768 (paratype, *E. anteacta*) (TTM).

Older material. 2 exs, Kashmir, 1900–64, Leech coll. (BMNH); 1 ♀, Kumaon, Muktesar, 7,500 ft., Sept 1922, Fletcher coll., BM Geom slide 21872 (BMNH).

Remarks. Warren did not designate type material, but makes it clear that his description was based on a female or females from the Khasia Hills. Only one specimen in the BMNH series dates from this period and fits this description: it bears the BMNH type label. Since it must be regarded as a syntype it is hereby designated as lectotype to ensure stability.

The BMNH series contains both males and females in excellent condition, and matching each other in all respects. We have also examined a long series from SW China, with associated males and females. We are confident that the two sexes are correctly associated. Schütze (1961) designated a male of *E. albispumata* as the holotype of *E. pengata*, and a female of the same species as the allotype of *E. lobbichlerata*, and was followed by Inoue (2000). We have examined Schütze's type material in Munich: it is in extremely worn condition, and it is not surprising that it was not possible to associate the sexes correctly. We have so far not successfully identified the female which Schütze designated as the allotype of *pengata*, and which is illustrated in Inoue (2000) fig. 1347, but suspect from the appearance of the genitalia that it may belong to the "*inepta-sacrosancta*" group. The male and female genitalia of *albispumata* are illustrated respectively in Inoue in figs 1314, as *pengata*, and 1344, as *lobbichlerata*. Male and female specimens of *albispumata* are illus-

trated respectively in plate 166, fig. 6, and plate 165, fig. 27.

Finally, Vojnits (1984) associated a female of *albispumata* with an unrelated male, which he named *anteacta*, and illustrated the genitalia in fig. 62.

### *Eupithecia rajata* Guenée, 1858

*Eupithecia rajata* Guenée, 1858, in Boisduval and Guenée, *Hist. nat. Insectes* (Spec. gén. Lépid.) **10**: 328.

*Eupithecia apparticeps* Inoue, 2000, *Tinea* **16** (Suppl. 1): 29, pl. 165, fig. 6; fig. 1327. **Syn. n.**

Misidentification: *bini* Vojnits, 1981, *Annls hist.-nat. Mus. natn. hung.* **73**: 231, fig. 15 (paratype ♀); *particeps* Vojnits, 1988, *Acta zool. hung.* **34**: 4, fig. 12 (paratype ♀).

This is a widespread species ranging through the southern Himalayas to Yunnan in south west China.

Examined type material. ♂, Type, Typicum specimen Ex Musaeo Ach. Guénée, *Rajata* Gn. Inde. Silhet, Ex Oberthur coll., Brit. Mus. 9927-3, Vojnits slide no 19349, "Holotypus *Eupithecia rajata* Guénée ♀, abdomen on ♂ body", BM Geometrid slide 16414 (holotype of *E. rajata*, BMNH); ♀, Nepal, Kathmandu, Godavari, 1,600 m, 26. ii. 1992, Inoue slide no 15927 ♀ (holotype of *E. apparticeps*, NSMT); 1 ♀, Nepal, Kathmandu, Chauni, 1,400 m, 31. viii. 1967, leg. W. Dierl and Schacht, Vojnits slide no 11760 (paratype of *E. bini*, ZSM).

Recent material: 1 ♂, Indien, J & K, Ladakh, Kharbu, 2,800 m, 12. vii. 1987, leg. W. Thomas (ZFMK); 1 ♀, Pakistan, Kohistan, Swat prov., Miandam, 72°32'E, 35°10'N, 1,800 m, 25. vi-5. vii. 1992, leg. Z. Weidenhoffer (ZFMK); 1 ♂ 1 ♀, Nord Indien, Himachal Pradesh, Kullu Valley, Manali, 2,000 m, 23-27. viii. (19)94, log. P. Kautt & V. Weisz (ZMKU).

Remarks. The identity of *rajata* is not straightforward. The name is based on a holotype male, which is preserved in BMNH, where it arrived via the Oberthür collection. This and a further male and female from the BMNH series were loaned in the 1980s to Dr Vojnits, and dissected by him. The holotype male proved to have a gummed female abdomen, which in fact belongs to *E. virgaureata* Doubleday (BM Geometrid slide no 19349). The other male (BM slide no 16415), and two other males in the series which we have since dissected (BM slides nos 21471 and 21989), have distinctive genitalia (Fig. 23) with two stout cornuti towards the apex of the aedeagus. The BMNH series is very uniform, and in good condition, and we therefore have no hesitation in basing our concept of *rajata* on these males.

The female is more difficult: there were only two females in the BMNH series. That dissected by Vojnits (BM slide no 16416) has eupitheciine genitalia which do not appear to fit this group of species; the second one, which we have dissected (BM slide no 21967), has entirely different genitalia which are identical to those of *E. apparticeps* Inoue, and which match those of recently collected material associated with males which are undoubtedly *rajata*. We conclude that this is the true female of *rajata*, and consequently synonymise *ap-particeps* with *rajata*. It seems likely that Vojnits' dissected female mentioned above (BM slide no 16416) is either another case of a gummed abdomen, or possibly, a mix up in the dissection process, of a kind which we have found elsewhere in Vojnits' material.

A specimen designated by Vojnits as the female of *E. bini* was illustrated by Inoue (2000, pl. 168, fig. 1): it is not however conspecific with the holotype (male) of *Eupithecia bini* Vojnits, 1981, and in our opinion is another example of *rajata*.



***Eupithecia ebriosa* Vojnits, 1979 (Fig. 13)**

*Eupithecia ebriosa* Vojnits, 1979, *Acta zool. Acad. Sci. hung.* **25**: 209, fig. 21.

Not hitherto recorded from the western Himalayas. Appears to range widely from Central China to the western Himalayas.

Examined type material. ♂, China, [Jiangxi], Kuling, 2. v. 1934, H. Höne, Vojnits slide no 11450 (holotype, ZFMK).

Older material. 1 ♂ 1 ♀, India, Naini Tal, 6,600 ft., 5. ix. 1934 and 15. ix. 1934, J. A. Graham, BM 1934-648, BM Geometrid slide 21840 ♂; 2 ♀, India U. P., Naini Tal, 6,600 ft., 14. vii. 1934 and 24. viii. 1934, J. A. Graham, BM 1934-514, BM Geometrid slide 21843; 1 ♂, India U. P., Naini-Tal, 6,600 ft., 30. vii. 1935, J. A. Graham, BM1935-424, BM Geometrid slide 21827 (BMNH).

Recent material. 1 ♂, Indien, J & K, Kashmir, Sonamarg, 2,700 m, 28. vii. 1987, leg. W. Thomas (ZFMK).

Remarks. Indian material is considerably smaller than material from China, but the genitalia are virtually identical.

***Eupithecia incurvaria* Hampson, 1903 (Fig. 14)**

*Eupithecia incurvaria* Hampson, 1903, *J. Bombay nat. Hist. Soc.* **14**: 643.

*Eupithecia propoxydata* Schütze, 1961, *Veröff. zool. StSamml. Münch.* **6**: 182, pl. 29, fig. 5; pl. 32, figs 2, 2a, 2b. **Syn. n.**

A very common species of the genus in the Himalayas. Distributed in Pakistan, India and Nepal.

Examined type material. 2 ♀, Goorais Valley, June 1887, J. H. Leech, Leech Coll. 1900-64, one (without abdomen) labelled *Eupithecia incurvaria* Hmps. type ♂ (*sic*) (syntypes, BMNH); ♂, Nepal: Manangbhot, 28°40'N, 84°01'E, Sabzi-Chu, 3,500 m, 9. vii. (19)55, F. Lobbichler leg. (holotype of *E. propoxydata*, ZSM).

Older material. 1 ♀, Kashmir, Koragbal, 8-9,000 ft., 22. vi. (19)42 (coll. Wiltshire in BMNH).

Recent material. 1 ♂, NW-Pakistan, Prov. Swat, Gabral-Tal, 15 km nördl. Kalam, 2,100 m, 6-9. vii. 1969, leg. Vartian, Vojnits slide no 15671 (TTM); 1 ♀, NW-Pakistan, Prov. Swat, Madyan, 71°90'L, 35°70'B, 1,400 m, 19. vi-4. vii. 1971, leg. Vartian, Vojnits slide no 17445 (TTM); 1 ♂ 4 ♀, Indien, J & K, Kashmir, Sonamarg, 2,700 m, 10-11, 28. vii. 1987, leg. W. Thomas (ZFMK); 1 ♂ 1 ♀, same locality, vic. Lotsun, 3,000 m, 17. vii. 1986 and 13. vii. 1987, leg. W. Thomas (ZFMK); 2 ♂, same locality, Gund, 2,200 m, 29. vii. 1987, leg. W. Thomas (ZFMK); 1 ♂ 1 ♀, N-Pakistan, 8 km N of Sost, 36°74'N, 74°49'E, 2,800 m, Nr. 17, 15. vi. 1992, leg. M. Hreblay & G. Csorba (ZISP); 1 ♀, Pakistan, Kashmir, Himalaya Mts, Deosai Mts, Bubin village, 74°59'E, 35°12.6'N, 3,150 m, 11-13. v. 1998, leg. Gy. M. László & G. Ronkay (TTM); 4 ♀, same locality, 3,000 m, 16. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 3 ♂ 2 ♀, same locality, 74°58'E, 35°12.6'N, 3,150 m, 19. vi. 1998, leg. Gy. Fábíán & B. Herczig (TTM); 2 ♀, same locality, 74°59'E, 35°12.6'N, 1-2. vii. 2000, leg. Z. Varga & G. Ronkay (ZFMK); 4 ♀, same locality, 75°02'E, 35°13.5'N, 3,300 m, 3. 6. vii. 2000, leg. Z. Varga & G. Ronkay (ZFMK, ZISP); 1 ♀, Pakistan, Himalaya Mts, Kaghan valley, Naran village, 2,900 m, 17. v. 1998, leg. Gy. M. László & G. Ronkay (TTM); 1 ♀, Pakistan, Himalaya Mts, Nanga Parbat area, Astor, Rama, 74°48'E, 35°21'N, 3,300 m, 13.

vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 3 ♀, Pakistan, Karakoram Mts, Naltar valley, 74°09'22"E, 36°11'08"N, 2,900 m, 20. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 1 ♀, same locality, 74°12'E, 36°09.6'N, 2,800 m, 22. vi. 2000, leg. Z. Varga & G. Ronkay (ZFMK).

***Eupithecia latimedia* Hampson, 1895 (Fig. 15)**

*Eupithecia latimedia* Hampson, 1895, *Fauna Br. India* (Moths) **3**: 400.

Examined type material. ♀, [India], Dalhousie, 92-98, Harford coll. 23. vi.(18)91, *Eupithecia latimedia* Hmps. type ♂ (*sic*) (lectotype, BMNH); 1 ♂ 2 ♀, Dalhousie, 92-98 Harford coll., 6. vi. (18)91, 30. vi. (18)91, and undated respectively (paralectotypes).

Older material. 7 exs, Dalhousie, May 1891, Rothschild coll.

Recent material. 1 ♀, India, UP, Kumaon, Himalaya, Distr. Nainital, Kilbury, 2,400 m, 18-31. v. 1990, leg. H. Speidel (ZFMK).

Remarks. Hampson's original description refers only to "Dalhousie (Harford)...type in BM". There are four specimens in the BMNH series deriving from the Harford collection, all collected in 1891, which bear the same acquisition number and would have been available to Hampson. In addition, there are a further seven specimens captured in Dalhousie in 1891 which came to the BMNH via the Rothschild collection, but which cannot have been regarded by Hampson as types, since they were not at the time of description in the museum. The first four must be regarded as syntypes. In order to ensure stability, we now designate the specimen bearing the BMNH type label as lectotype, and the other three specimens as paralectotypes (label details above).

***Eupithecia acolpodes* Prout, 1938 (Fig. 16)**

*Eupithecia acolpodes* Prout, 1938, *Macrolepid. Wld* **4** (Suppl.): 198, pl. 13, fig. i.

Examined type material. ♀, Kashmir Valley, 7,000 ft., August 1903 (coll. Ward), *Eupithecia acolpodes* Prout ♀ type, BM Geom. slide no 11804 (holotype, BMNH).

Recent material. 1 ♀, NW-Pakistan, Prov. Swat, Gabral-Tal, 15 km nördl. Kalam, 2,100 m, 6-9. vii. 1969, leg. Vartian, Vojnits slide no 15133 (TTM); 1 ♀, Pakistan, Gilgit, Naltar, 3,000-3,200 m, 19-23. viii. 1982, leg. Eckweiler, Ratzel slide no GU2905/3w (SMNS); 1 ♀, Pakistan, Himalaya Mts, Kaghan valley, 20 km NE Balakot Tathabaya, 73°25'E, 34°41'N, 2,400 m, 25. vii. 1994, leg. B. Herczig, Gy. M. László & G. Ronkay (TTM); 1 ♂ 1 ♀, same locality, Tathabaya, 73°25'91"E, 34°35'33"N, 2,150 m, 9. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 1 ♂, same locality, Tathabaya, 73°27'01"E, 34°36'48"N, 2,300 m, 22-23. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 1 ♂ 1 ♀, Pakistan, Karakoram Mts, Naltar valley, 74°09'22"E, 36°11'08"N, 2,900 m, 20. vii. 1998, leg. G. Csorba & L. Ronkay (TTM); 1 ♂, same details but 74°12'E, 36°09.6'N, 18. vii. 1998, leg. G. Csorba & Ronkay (coll. László); 1 ♂, Pakistan, Kashmir, Himalaya Mts, Deosai Mts, Bubin village, 74°59'E, 35°12.6'N, 3,150 m, 1-2. vii. 2000, leg. Z. Varga & G. Ronkay (ZFMK).

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## 摘 要

西部ヒマラヤのカバナミシヤク属 II (V. MIRONOV · A. C. GALSWORTHY · U. RATZEL)

本報は、ヒマラヤ西部のカバナミシヤク属 (*Eupithecia*) の再検討のシリーズの第2報で、4新種1新亜種 (*E. alexiae* Galsworthy & Mironov, *E. pannosa* Mironov & Galsworthy, *E. vetula* Mironov & Ratzel, *E. firmata* Mironov & Ratzel, *E. pusillata kashmirica* Mironov & Ratzel) の記載を含むほか、3種の学名の変更ならびに約12個の名称をシノニムとして整理した。日本産種について学名の変更を要するものは次の通りである。

ミヤマカバナミシヤクは *Eupithecia pacifica* Inoue, 1980 として記載されたが、本種はその前年に中国から記載された *E. impavida* Vojnits, 1979 と同種であったので、ミヤマカバナミシヤクの学名は *E. impavida* Vojnits となる。ただし、*E. pacifica* の模式系列には2種混在していることが分かり、ホロタイプは *Eupithecia consortaria* Leech, 1897 (クロモンカバナミシヤク) であった。また、セアカバナミシヤクは *Eupithecia tricornuta* Inoue, 1980 として記載されたが、この名称は *Eupithecia quadripunctata* Warren, 1888 のシノニムであった。

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